

**VICTORIAN CIVIL AND ADMINISTRATIVE TRIBUNAL**

**ADMINISTRATIVE DIVISION**

**PLANNING AND ENVIRONMENT LIST**

**VCAT REFERENCE NOS.  
P1816/2011, P1818/2011**

**P1820/2011, P1822/2011,  
P1829/2011 & P1846/2011**

**IN P1829/2011 & P1846/2011 BETWEEN:**

**DUAL GAS PTY LTD**

Applicant

and

**ENVIRONMENT PROTECTION AUTHORITY**

Respondent / Authority

**IN P1816/2011, P1818/2011, P1820/2011 & P1822/2011 BETWEEN:**

**MARTIN SHIELD (P1816/2011)**

**DOCTORS FOR THE ENVIRONMENT AUSTRALIA INC (P1818/2011)**

**ENVIRONMENT VICTORIA INC (P1820/2011)**

**LOCALS INTO VICTORIA'S ENVIRONMENT INC (P1822/2011)**

Applicant

and

**ENVIRONMENT PROTECTION AUTHORITY**

Respondent / Authority

and

**DUAL GAS PTY LTD**

Respondent

**CLOSING SUBMISSIONS**

**ON BEHALF OF THE ENVIRONMENT PROTECTION AUTHORITY**

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*\* For ease of reference, a detailed index to the full document follows.*

*An Index of responses to issues raised by the Tribunal follows the detailed index.*

*A detailed Index for each Part is provided at the front of that Part.*

## Index of responses to issues raised by Tribunal

During the last day of the hearing in 2011 (17 November 2011) the Tribunal outlined a number of issues which it asked the parties to address in their closing submissions. The EPA has addressed all relevant issues in the body of these submissions. However, for ease of reference, set out below is a list of the issues raised and where they have been addressed.

<b>Issue</b>	<b>Transcript reference</b>	<b>Closing submissions reference</b>
Review of Works Approval Conditions	DP Dwyer, P1753 L22-25	Section 23 (paragraphs 977-996)
Staged approach and validity of conditions	Member Potts, P1762 L6-16	Section 5.3 (paragraphs 55-65)
0.8 Limit - "as generated" vs "as sent out"	DP Dwyer, P1754 L13-16	Section 14.2 (paragraphs 358-384); Section 23 (paragraph 981)
Regulatory requirements re: commissioning	DP Dwyer, P1761 L21-29	Part 5.1 (paragraphs 43-44) Section 23 (paragraph 980)
Works Approval vs Licence Conditions	DP Dwyer, P1761 L15-18	Section 5.1 (paragraphs 41-51)
Application of section 14 of the CC Act	DP Dwyer, P1757 L26-P1758 L1	Section 10 (paragraphs 182-217)
Relevance of the 20% reduction target	DP Dwyer, P1758 L8-11	Section 10 (paragraphs 182-218, particularly at 218)
Taking account of EP Act section 37A (especially the planning scheme)	DP Dwyer, P1759 L6-24	Paragraph 38; Sections 6 (paragraphs 66-70); and Section 7 (paragraphs 71-88)
Relevance of broader regulatory framework	DP Dwyer, P1759 L27-29	Part D (paragraphs 219-253)
Relevance of CFC Program	DP Dwyer, P1760 L1-17	Section 11.4 (paragraphs 235-247)
Meaning of "CCS-ready"	DP Dwyer, P1760 L18-27	Section 11.3 (paragraphs 226-234)
Relevance of the prospect of CCS	DP Dwyer, P1760 L1-17	Section 11.3 (paragraphs 226-234); paragraphs 341-342, 350

Issue	Transcript reference	Closing submissions reference
Link between SO <sub>2</sub> reduction and CCS-readiness	DP Dwyer, P1760 L28-30	Section 16.4 (paragraphs 698-700)
Trading SO <sub>2</sub> reduction against increased GHG emissions	DP Dwyer, P1760 L31-P1761 L7	Section 16.9 (paragraphs 770-780, 787-791)
Relevance of other emissions (e.g. water discharges and transport issues)	DP Dwyer, P1761 L14-15	Section 21 (paragraphs 953-976)

## Part A Introduction

1. These are the closing submissions on behalf of the EPA.
2. Senior Counsel will orally outline the structure of these Closing Submissions, the approach taken to analysing the issues together with an explanation as to the methods adopted to guide the Tribunal to the multiplicity of references cited, so that the Tribunal can be assisted to the greatest extent possible. Senior Counsel will then provide some overview observations regarding critical aspects of the DGDP and provide the EPA's perspective of certain ramifications of the Tribunal's determination.

## Part B Preliminary Legal Issues

### 1 The Failure to Decide Application

3. At the hearing, Counsel for Dual Gas submitted that the application made by Dual Gas under section 33(1)(b) of the Environment Protection Act 1970 (**EP Act**) was a ‘secondary’ application which Dual Gas would only pursue if denied the opportunity to obtain review of the works description as a condition<sup>1</sup>.
4. The EPA has advised Dual Gas that (as set out below) it will support its submission that it is entitled to seek review of the works description as a condition.
5. On that basis, the EPA understands that Dual Gas intends to withdraw its application under section 33(1)(b) of the EP Act and will not contest certain matters which arise in consequence.
6. In any event, the EPA submits that, in light of section 4(2)(b) of the *Victorian Civil and Administrative Tribunal Act 1998* (Vic) (**VCAT Act**), Dual Gas’s application under section 33(1)(b) is technically misconceived and must fail.

### 2 Dual Gas’s Application to Review the Works Description

#### 2.1 The works description as a “condition”

7. The EPA submits that, as a matter of general principle, conditions are conditions imposed on the approval and the works in the works description are what is approved.
8. However, it accepts that, as a matter of fairness, it cannot have been the intention of the EP Act to exclude an application for review by an applicant who has been issued with a works approval for something which is only part of what it applied for.
9. Accordingly, it does not oppose Dual Gas’s submissions in that respect.

#### 2.2 The EPA’s attitude to the 300MW “condition”

10. The EPA invites the Tribunal to take note that, but for its ability to scale the project down, the EPA would have refused the project outright.

### 3 The Question of “Transformation”

11. Counsel for Dual Gas has indicated<sup>2</sup> that, assuming the 300MW limitation is open for review as a condition, his client does not take issue with the power of the EPA to

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<sup>1</sup> Dual Gas, opening submissions, P491 L6-13

<sup>2</sup> Dual Gas, opening submissions, P489 L9-17

permit a 300MW power station in circumstances where a 600 MW power station has been applied for.

12. He went on to say<sup>3</sup> that:

... as far as the power of the EPA to modify an application by imposition of conditions, I would accept that there would be a limit for the exercise of that power. For example, if it had imposed conditions that turned this power station into a refuse disposal landfill, that would be going too far... .The fact that the condition has the effect of halving the size, in our submission, doesn't mean there's been a transformation.

13. The EPA agrees.

14. In the context of section 4(2)(b) of the VCAT Act, the question of whether the EPA had power to approve a 300MW rather than 600MW plant does not arise. However, the point is relevant for the Tribunal's own decision-making and the Tribunal has noted<sup>4</sup> that in the planning jurisdiction a decision-maker's ability to "scale down" a proposal to the extent that "it may not be what was applied for" is "a bit unclear".

15. In a Victorian context, it is customary to refer to the decision of Brooking J of the Victorian Supreme Court in *Addicoat and Others v Fox and Another; Watts Development Division Pty Ltd v Fox and Another* [1979] VR 347; (1979) 37 LGRA 411 (**Addicoat v Fox**). Interpreting the provisions of the then *Town and Country Planning Act 1971* (Vic), his Honour held that "the application which the planning authority may proceed to consider is the application as constituted at the latest at the date of the giving or publishing of the [public] notice". However, this case was decided under a different enactment and centred on procedural fairness to third parties in the context of applicant-initiated changes to its proposal. Relevantly, also, Brooking J found it unnecessary in the circumstances to decide the point at which a transformation would occur. He said at page 363:

In my opinion, a power to grant a permit subject to conditions authorises the responsible authority to grant a permit for the use or development which differs from the use and development the subject of the application for a permit, provided that the difference is not so radical as to enable it to be said, viewing the matter broadly and fairly, that to grant a permit on the supposed conditions would not be to grant the permit applied for with modifications, but to grant a different permit. This is plainly a matter of degree, and indeed it is almost one of impression. In my view, the changes may be considerable without necessarily bringing it about that the permit granted is [a] different as opposed to a modified

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<sup>3</sup> Dual Gas, opening submissions, P490 L15-22

<sup>4</sup> DP Dwyer, opening submissions, P478, L17-23

permit. Whether more may be countenanced by way of limiting the development or use... before the point is reached at which alteration ceases to be modification and becomes transformation, is a question which I find it unnecessary to decide.

16. Over the years the AAT and then the Tribunal appear to have applied this case conservatively, with effect that the Tribunal's response to a problematic proposal is frequently to refuse the application outright (and to indicate – unofficially, as it were – that a fresh application would be seriously entertained).
17. However, unless there are compelling reasons of fairness to do so, there are serious and obvious inefficiencies in a process which requires an applicant to commence again with an entirely new application, if the Tribunal is prepared to indicate that a reduced or modified proposal is acceptable and third parties are affected in exactly the same (albeit less substantial) way as they were by the original proposal.
18. Moreover, it is difficult to see how a reduction in the capacity of the proposed demonstration plant differs in principle from the removal of a top floor, increased setbacks or a reduction in lot or dwelling numbers from those applied for, which is commonly done by both responsible authorities and the Tribunal by way of response to applications.
19. In Queensland, where the *Integrated Planning Act 1997 (IPA)* has been amended to include an express power to approve an application in part, there is recent, persuasive case law distinguishing “transformation” on the one hand from “marked difference” where the approval given differs from what was applied for in that it is *part* (only) of what was applied for.
20. In *SLS Property Group Pty Ltd v Townsville City Council and Others; Catchlove and Others v Townsville City Council and Others* [2009] QCA 380; (2009) 175 LGERA 136 the Queensland Court of Appeal considered an application for leave to appeal from a Planning and Environment Court decision upholding the approval of Stage one (only) of a two stage proposal. In declining leave, the Court at [11]-[12] approved of the trial Judge's statement, adopting but distinguishing *Barakat Properties Pty Ltd v Pine Rivers Shire Council* [1994] QCA 384; (1994) 85 LGERA 99 (**Barakat**), to the effect that the power to approve in part cannot extend to approval of something “materially different ... but this is not the case here: what has been approved here is part of the whole applied for”. The Court further said at [21]:

Where the only material difference between the application and the approval is that the development approved is part of the development for which application was made, the case falls, *prima facie*, within the terms of section 3.5.11(1) of the IPA [ie. the power to approve in part]. For a viable argument to arise that the

case is outside section 3.5.11(1) of the IPA there must be features of the development which was approved which justify characterising that development as something materially different from that which was applied for, other than the mere fact that it was part of what was applied for.

21. Keane JA, with whom the other judges concurred, differentiated between what was “materially different” and what was “markedly different”, but not materially so. He said at [13]:

SLS and Centro confuse the point that a development consisting only of stage 1 is “markedly different” from a development consisting of stage 1 and stage 2 with the different point – clearly appreciated by the learned primary judge – that an approval of one part of a two part application is not an approval of a different application – at least where it is apparent that the two are not mutually dependent.

22. In concurring with Keane JA, Holmes JA said at [27]:

I would simply add that I doubt that concepts of “material” or “substantial” difference have any application where all that is contemplated is the approval of part of the development applied for.

23. Although this authority is influenced by the express power to approve in part, it does not depend on the existence of that power. In *Grant v Pine Rivers Shire Council* [2006] QPLR 112; [2005] QPEC 81 (**Grant**), Wilson SC DCJ (as he then was) of the Queensland Planning and Environment Court affirmed that approval “in part” is inherent in approval subject to conditions, as provided for in the previous *Local Government (Planning and Environment) Act 1990* (Qld) (**PEA**) which applied to the matter under the transitional provisions of the IPA. He said at [15]:

Council’s power under PEA s4.4(5) to approve an application subject to conditions necessarily implies a power to approve an application in part. That is what occurred in *Mt Marrow Blue Metal Quarries Pty Ltd v Moreton Shire Council* (1994) 85 LGERA 408 in which an application for rezoning and subdivision of land was approved, but subject to conditions which reduced the number of approved lots shown on the plan of development.

24. His Honour went on to discuss two further matters relevant to the question of transformation. The first concerned provisions of the legislation which expressly limited the scope of change to “minor changes” (which did not apply on the facts).

25. The second was “whether the alteration in the development comprised in the original application is of such substance, consequence or significance as to call for readvertisement of the application.” He commented that:

... planning courts in Queensland have previously not acted on a rule like that adopted in *Mison* (supra)<sup>5</sup> of asking whether or not the imposition of a condition has the effect of “significantly altering” the development in respect of which an application was made. ...[T]he criterion used in Queensland has so far been whether the alteration in the development comprised in the original application is of such substance, consequence or significance as to call for readvertisement of the application.

26. It is submitted that it is appropriate for the Tribunal to have regard to this recent Queensland jurisprudence which, in summary, is to the effect that:
- the power to approve a proposal subject to conditions enables a proposal to be approved in part and refused in part (whether, conceptually, this is represented as a partial approval or an approval subject to conditions);
  - the principles to be applied in determining the “boundary” between approval in part and transformation are (1) whether, as a matter of fairness to third parties, the modified proposal should be re-advertised; and (2) whether the approved proposal is “materially different” (as distinct from “markedly different”) from what was applied for; and
  - approval of part of what was applied for does not, of itself, amount to a “materially different” proposal.
27. The EPA’s power in section 19B(7) of the EP Act to issue a works approval subject to conditions is expressed by reference to a (not *the*) works approval being issued (or refused). Far from restricting the scope of permissible change, this grammar implicitly recognises that, (subject to not “transforming” the proposal), the EPA (and the Tribunal, standing in its shoes) enjoys a discretion as to the content of the works approval it determines to issue. This is further reinforced by the broad power to impose “such conditions as the Authority considers appropriate”.
28. In considering planning law precedent it is also necessary to take into account key differences between the EP Act and the P&E Act which give rise to very different circumstances and powers. Under the EP Act, the EPA has the power to unilaterally amend a works approval. The limitations on this power generally require the amendment to result in no additional environmental impact and no adverse impact to persons *other than the holder of the works approval* (our emphasis). There is no provision within the EP Act for the applicant to amend its works approval application or to seek amendments to its works approval. In comparison with the *Planning and Environment Act 1987* (Vic) (**P&E Act**), which contains very detailed provisions relating

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<sup>5</sup> *Mison v Randwick Municipal Council* (1991) 23 NSWLR 734

to the amendment of applications (and the further third party notification required when this occurs) and limits the power of the Responsible Authority to amend a permit on its own accord, the EP Act vests the EPA with over-riding discretion to dictate and change the terms of the works approval, even where the change is adverse to the works approval holder.

29. In these circumstances, the EPA submits that a decision to approve a 300MW demonstration plant is within the power conferred by the EP Act and, in accordance with the analysis of common law principles above, does not amount to transformation.
30. As a fall-back, if the Tribunal determines to confirm the EPA's decision but is concerned that it lacks power to approve the DGDP at 300MW, in order to put the matter beyond doubt the Tribunal may amend Dual Gas's works approval application such that it is for a 300MW plant. Section 64(2) of Schedule 1 of the VCAT Act gives the Tribunal the power to make "any amendment it thinks fit" to a works approval application, at any time in a proceeding, and is clearly broad enough to encompass such an amendment.

## 4 Scope of Tribunal Review

### 4.1 Dual Gas's application for review of certain conditions

31. The Tribunal's task on a conditions review is ordinarily to consider only the contested conditions. Such a review does not enable the Tribunal to decide the matter *de novo* or include any conditions that are not findings in relation to the contested condition or consequential thereto.
32. Dual Gas has applied under section 33(3) for review of conditions 1.2, 1.3, 2.6, 2.7, 3.1(a) and 3.1(b) of the Works Approval. However, in the context of the third party applications this restriction has no practical effect.

### 4.2 Scope of Tribunal's review in response to third party applications

33. It is clear from section 33B(2) of the EP Act that third parties have only limited grounds on which they can seek review of the grant of a works approval.
34. Accordingly, the EPA agrees with Dual Gas that the third parties may only put their case on either or both of the grounds set out in section 33B(2) and they are not entitled to put forward arguments outside those grounds when making their case.
35. This restriction extends to arguments based on the *Climate Change Act 2010* (Vic) (**CC Act**) and appears to form the basis of Dual Gas's contention that the CC Act is

“not relevant at all in the context of the objector appeal”<sup>6</sup>. In so contending, Dual Gas has said that it will rely on the precedent in *Thirteenth Beach Coast Watch Inc v The Environment Protection Authority & Anor* (2009) 178 LGERA 232; [2009] VSC 53 (**Thirteenth Beach**).

36. However, the EPA does not agree that the CC Act and other matters pertaining to the EP Act more generally are “not relevant” to the Tribunal’s own consideration of the case and submits that the Tribunal is bound by mandatory considerations beyond the scope of what the third parties are entitled to argue.
37. It is of note that Cavanough J’s remarks in *Thirteenth Beach* that “it is at least arguable that the function of the Tribunal under s 33B is merely to respond to the case put by the applicant”<sup>7</sup> are obiter and inconclusive. By contrast, there are specific provisions of the EP Act and of the VCAT Act/CC Act which mandate Tribunal consideration of matters outside those upon which a third party is entitled to make its case.
38. The following supports the EPA’s submission:
- (a) Section 51(1)(a) of the VCAT Act provides that, in exercising its review jurisdiction in respect of a decision, the Tribunal “has all the functions of the decision-maker”. Functions are defined to include “jurisdiction, power, duty and authority”<sup>8</sup>. One of the key functions of the EPA under the EP Act is
- by the issue of works approvals, licences, permits, pollution abatement notices, minor works pollution abatement notices, research, development and demonstration approvals and notices under section 28B, to control the environmental impacts of activities which create a state of potential danger to the environment and to control the volume, types, constituents and effects of waste discharges, emissions, deposits, or other sources of pollutants and of substances which are a danger or a potential danger to the quality of the environment or any segment of the environment and the generation, storage, reprocessing, treatment, transport, containment and disposal of waste and to control the volume intensity and quality of noise<sup>9</sup>
- (b) In addition, the EPA, in considering a works approval application, “... must have regard to policy so that the authorisation and any condition in, or relating to, the authorisation is consistent with all applicable policy”<sup>10</sup> and may refuse to issue a

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<sup>6</sup> Dual Gas, general discussion, P1763 L3-15

<sup>7</sup> *Thirteenth Beach Coast Watch Inc v EPA* (2009) 178 LGERA 232; [2009] VSC 53 at [42]

<sup>8</sup> VCAT Act, section 3

<sup>9</sup> EP Act, section 13(1)(d)

<sup>10</sup> EP Act, section 20C(2)

works approval if, in its opinion, the issue would be contrary to policy, likely to cause or contribute to pollution or be likely to cause an environmental hazard<sup>11</sup>.

- (c) These considerations are clearly broader than the third party grounds of review set out in section 33B(2) of the EP Act.
- (d) Section 37A of the EP Act sets out various matters that the Tribunal must take into account in determining the third parties' applications for review, some of which fall outside the grounds set out in section 33B(2) (for example, planning schemes). Also, section 51 of the VCAT Act imports the requirement on the Tribunal to have regard to the matters set out in section 14 of the CC Act. This is not disputed by Dual Gas.<sup>12</sup>
- (e) Further, under section 37(a) of the EP Act, in response to the third party applications for review, the Tribunal may "direct that a works approval shall or shall not be issued". The wording of that power is wider than simply determining whether or not the third party's grounds of review should be upheld and as a necessary consequence the works approval refused.
- (f) Despite Cavanough J's tentative opinion in *Thirteenth Beach* that the opposite was "at least arguable", he also stated that where a third party has made out a ground of review "it seems to me that ... the review would be at an end, save perhaps for a limited discretion in the Tribunal to decline to intervene for some good reason"<sup>13</sup>. This implies that the Tribunal may take other matters into account when determining whether or not to direct that a works approval be refused in response to a third party application for review.
- (g) Consistent with this, in the first *Thirteenth Beach* proceeding<sup>14</sup>, the Tribunal held that the third party's application for review failed but nevertheless went on to consider whether it was appropriate for a works approval to be issued. The Tribunal held that "... we are also satisfied on the basis of the detailed expert evidence provided by the EPA and Plenary that it is appropriate that a works approval be issued"<sup>15</sup> but held that certain conditions should be added/amended.
- (h) The High Court has recently held that, in undertaking a review under the *Taxation Administration Act 1996* (NSW), the Parliament intended that the Supreme Court of NSW would have all the powers and functions of the original

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<sup>11</sup> EP Act, section 20C(3)

<sup>12</sup> Dual Gas, opening submissions, P583 L8-25

<sup>13</sup> *Thirteenth Beach Coast Watch Inc v EPA* (2009) 178 LGERA 232; [2009] VSC 53 at [41]

<sup>14</sup> *Thirteenth Beach Coast Watch Inc v EPA* [2008] VCAT 1880

<sup>15</sup> *Thirteenth Beach Coast Watch Inc v EPA* [2008] VCAT 1880 at [24]

decision maker (as is the situation here) and therefore was not limited to the taxpayer's grounds of "appeal"<sup>16</sup>.

39. Therefore, in the EPA's submission, the Tribunal would not be beyond power if it were to venture into areas of inquiry beyond the scope of the third party grounds of review when determining whether to direct that a works approval be issued, given the breadth of its "functions" in issuing works approvals. This would include, for example, consideration of water discharges or transport issues. Further, it must consider the mandatory considerations discussed below.

## 5 Nature of Conditions

40. At the hearing the Tribunal asked a number of questions concerning the nature of the conditions in WA67043.

### 5.1 Relationship between works approval conditions and licence conditions

41. Mr Sharpley queried why the Works Approval is specifying limits "...when it has been presented at other venues including VCAT that they do not specify limits [but] ... just specify that noise shall be contained or not annoying or various other phrases...".<sup>17</sup>
42. The underlying issue here is the purpose of a works approval as compared with a licence. The Tribunal raised this same issue when asking where the line should be drawn between what is relevant to the works approval and what is relevant to the operating licence<sup>18</sup>.
43. A works approval does not authorise operational discharges. Only a licence or a consent to commissioning under section 30A of the EP Act can do that. The licence or consent is generally subject to conditions which impose operational constraints (i.e. "limits") on the discharge/emission of particular substances.
44. Thus, it is the business of a licence (rather than a works approval) to specify the "limits" on specified emissions (e.g. NO<sub>x</sub>) or prescribe the nature of the fuel mix which must be adopted operationally.
45. Historically, this meant that works approvals focused on the engineering detail of a proposal and whether it was, in the opinion of the EPA, capable of operating without causing unacceptable pollution. However, with the culture shift towards performance-based approvals, it is now common for works approvals to require the design and

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<sup>16</sup> *Tasty Chicks Pty Ltd v Chief Commissioner of State Revenue (NSW)* [2011] HCA 41; 85 ALJR 1183

<sup>17</sup> Sharpley, opening submissions, P357 L15-20

<sup>18</sup> DP Dwyer, general discussion, P1761 L15-18

- construction of works to be such that, when operational, the facility will be able to meet specified operational outcomes (of the kind intended to be imposed by the licence).
46. Another factor in this revised approach is the stipulation in section 20(7) of the EP Act that a licence may be subject only to “such conditions which are not inconsistent with any conditions specified in the works approval”.
47. The problem of consistency is avoided if the works approval anticipates licence conditions by requiring the plant to be *designed and constructed* so as to be capable of complying with them. This does not usurp the role of the licence or venture beyond the proper (i.e. design and construction) scope of a works approval. But its benefits are three-fold. First, it puts the approval-holder on notice of likely licence conditions which may affect its decision to proceed and prevents it claiming that the plant was constructed in ignorance of (or without allowing for) anticipated licence conditions. Second, it passes the risk of unacceptable performance of the works from the EPA to the proponent. Third, it addresses section 20(7) by directly aligning the design and construction conditions mandated by the works approval with the operational parameters which the EPA intends to *impose* via the licence.
48. This is particularly important where future operating scenarios will or may require the installation and use of additional equipment to secure appropriate performance.
49. The conditions on WA 67043 are of this kind and do not step over the line between specifying design, construction and the installation of equipment on the one hand and controlling operations, on the other.
50. The following conditions are of this kind (our emphases) <sup>19</sup>:
- (a) Condition 2.1 – The plant must be *designed in a manner* which enables it to comply with an operational Greenhouse Gas Emissions Intensity (**GEI**) requirement of 0.8 tCO<sub>2</sub>-e/MWh to the satisfaction of the EPA.
  - (b) Condition 2.3(d) – *provisions for sampling* are included [in the exhaust stacks] in accordance with EPA Publication No. 440.1, *A Guide to the Sampling and Analysis of Air Emissions and Air Quality*.
  - (c) Condition 2.4 – The occupier *must install on the main process exhaust stack* a device capable of continuously and accurately measuring and recording the concentration and mass emission rate of:
    - (i) sulfur dioxide;
    - (ii) nitric oxide;

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<sup>19</sup> EPA, Works Approval WA67043, EPA.020.285

- (iii) nitrogen dioxide;
  - (iv) carbon monoxide; and
  - (v) particulate matter (PM<sub>10</sub>).
- (d) Condition 2.6 – The noise design targets *for the purpose of condition 3.1* are specified in Table 1 and are to be assessed in accordance with *State Environment Protection Policy (Control of Noise from Commerce Industry and Trade) No. N-1*.
- (e) Condition 3.1 - Before commencing construction, the occupier must submit to the EPA for written approval a report that includes ... details of (among other things) c) provision for the future installation of carbon capture equipment; and d) - provision 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.

51. It is submitted that these are appropriate conditions, consistent with a performance based approach to design specification and the requirements of section 20(7).

## **5.2 Without prejudice mark-up of the Works Approval**

52. When adjourning the hearing, the Deputy President invited the EPA to review the conditions and consider “... whether some are a little uncertain, whether some need to be reworded, whether some need to be added or deleted”<sup>20</sup>.

53. The Deputy President also requested the EPA to prepare a set of without prejudice conditions and circulate them to the parties.

54. The amendments and additions to the Works Approval that the EPA has prepared, on a without prejudice basis, are included in Part H of these submissions.

## **5.3 Potential for a staged approach**

55. At the adjournment of the hearing, Mr Potts requested that the review of conditions be extended to consider the possibility of a staged approach to the development of the project, focusing on “whether such conditions would actually be valid, and if they are, then how one might approach it”.

56. For reasons set out later in these submissions, the EPA opposes a staged approach, by which it is assumed the Member means the grant of a works approval for both Stage 1 and Stage 2, subject to conditions precedent or secondary consent. The EPA’s opposition to such a course of action is based on the lead time to Stage 2 in an environment of rapid policy and technological change (when the works approval process is charged with addressing climate change), the lack of a precautionary

<sup>20</sup> DP Dwyer, general discussion, P1753 L22

- approach in locking in a full-scale project when only one process train is required to demonstrate the technology and failure to meet the requirement of best practice if proposed second E-class gas turbine (**GT2**) is permitted as part of Stage 1.
- 56A The EPA also considers that approval should not be granted for a contingency, the likelihood and timing of which are unknown.
57. If a staged approval were to be granted with an E-class GT2 as part of Stage 1, there is no scope for any meaningful change to Stage 2. To require GT2 to be replaced by an F-class gas turbine is simply not feasible.
58. If, on the other hand, GT2 is deferred to Stage 2, it is questionable what purpose the staged approval would serve as compared with requiring a further works approval application for Stage 2. Any such purpose is unlikely to outweigh the lost regulatory opportunity to again consider the matters required by the CC Act, the principles of environment protection and best practice.
59. There are also some legal difficulties with such an approach, which vary according to how the pre-conditions for Stage 2 are set.
60. The EPA has considered how these pre-conditions could be structured and has identified three possible mechanisms for subjecting Stage 2 to revised technology or performance requirements (assuming that GT2 were deferred to Stage 2). Each of them is problematic.
61. These three mechanisms are:
- (a) conditions precedent which, when met, trigger the Stage 2 approval;
  - (b) a requirement that, if a syngas-compatible F-class turbine is available on the market at any time up to three months prior to the commencement of Stage 2, GT2 must be F-class; or
  - (c) a “secondary consent” which subjects GT2 (and possibly other aspects of the plant) to further EPA review and approval, within the overall context of Stage 2 having been pre-approved.
62. In relation to (a), Stage 2 might be deferred by condition until such time as improved technology is available: for example, an F-class or equivalent syngas-capable turbine or CCS. This potentially defers Stage 2 indefinitely. Because of its potential to frustrate the grant of approval for both stages and by reason of its uncertainty, such a condition may in fact be invalid.
63. In relation to (b), the term “available” is open to a variety of interpretations and thus is inherently uncertain. It is also able to be manipulated and would be difficult to enforce. Even if the EPA were to be given power to determine when the technology is

“available”, there are several Ministerial appeal cases in Western Australia in which such a condition was successfully challenged. For example, a condition imposed on the Collie Urea Shotts Industrial Park to the effect that CCS must be retro-fitted within a specified period of the EPA determining that it is “economically and technically proven” was rejected on the basis of the uncertainties of adopting and implementing CCS, including determining the economic and technical viability.<sup>21</sup>

64. In relation to (c), unlike the P&E Act, the EP Act does not contain any specific power in relation to secondary consents or any mechanism for legal review of a secondary consent decision. This means that there is an inherent risk of the secondary consent process frustrating the wider approval. Even more importantly, secondary consents cannot displace a primary consent requirement. They ordinarily apply where further detail is to be provided within defined parameters (e.g. a landscape plan) or to accommodate minor variations to plans. It is not appropriate for them to be used to change the approved works description or to enable informal reassessment of the matters which go to the core of a works approval (i.e. technological acceptability).
65. Accordingly, the EPA submits that the safest and best course of action is to refuse Stage 2 and enable the EPA to comprehensively assess it on its merits at the relevant time if Stage 2 is to proceed at all.

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<sup>21</sup> Office of the Appeals Convenor, Report to the Minister for the Environment in Appeal Nos. 62-64 of 2010 (Collie Urea Project, EPA Report 1358), p12-13; Minister for Environment (WA), Appeal Determination in Appeal Nos. 62-64 of 2010, p2-3; See also: Office of the Appeals Convenor, Report to the Minister for the Environment in Appeal Nos. 21-23 of 2010 (Bluewaters Power Station Expansion, Phase II and IV, Collie, EPA Report 1349) p16-17; Minister for Environment (WA) Appeal Determination in Appeal Nos. 21-23 of 2010, p4 (3rd paragraph)

## Part C Regulatory Framework

### 6 Matters which the Tribunal must take into account

66. Section 37A of the EP Act states that, in determining an application for review or a declaration under Part IV of the EP Act, the Tribunal must -
- (a) take into account any relevant planning scheme; and
  - (b) where appropriate, have regard to any planning scheme or amendment adopted by a planning authority under the P&E Act but not, as at the date the application is determined, approved by the Minister or the planning authority; and
  - (c) take account of and give effect to, any relevant State environment protection policy (SEPP) or waste management policy (WMP); and
  - (d) where appropriate, have regard to any agreement made under section 173 of the P&E Act affecting the subject land.
67. The EPA submits that the requirement to take into account “any relevant planning scheme” necessarily covers all parts of that scheme, including the state and local policy frameworks that form part of the scheme.
68. Also, the EPA submits that the list of mandatory requirements in section 37A of the EP Act is not exhaustive<sup>22</sup> and that the Tribunal is also required to have regard to the principles of environment protection and the matters set out in section 14 of the CC Act when determining whether a works approval should or should not be issued.
69. Counsel for Dual Gas has pointed out<sup>23</sup> that, technically speaking, the Tribunal in directing the issue of a works approval does so under section 37(a) of the EP Act, rather than section 19B, and accordingly section 14 and Schedule 1 of the CC Act may not capture the Tribunal. The EPA agrees with Counsel for Dual Gas that any deficiency in this regard is addressed by section 51 of the VCAT Act.
70. Accordingly, in making a decision under section 37 of the EP Act with respect to a works approval, the Tribunal is required to take account of these considerations.

### 7 Planning Scheme

71. With respect to the section 37A(a) EP Act consideration, the Latrobe Planning Scheme applies to the site. The following provisions of the planning scheme are relevant to this application.

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<sup>22</sup> *Skye Environmental Services Pty Ltd v Frankston CC* [2004] VCAT 682 (paragraphs 62-63)

<sup>23</sup> Dual Gas, opening submissions, P583 L1-10

## 7.1 Planning Controls

72. The statement of evidence of Mr Marco Negri on behalf of Dual Gas<sup>24</sup> identifies the relevant planning controls over the DGDP land as being: Special Use Zone, Schedule 1 (Brown Coal), Environmental Significance Overlay, Schedule 1 (Urban Buffer) (over part of the site) and particular provisions 52.06 – Car Parking; 52.07 – Loading and Unloading of Vehicles; and 52.17 – Native Vegetation.
73. The EPA agrees that these are the relevant controls. However, as outlined in its submissions to the Tribunal on 26 August 2011 and 30 October 2011 (**previous submissions**)<sup>25</sup> and contrary to Mr Negri's conclusion, the EPA considers that a planning permit is required for the DGDP. This no longer appears to be seriously contested by any party.
74. If it is correct that the DGDP requires a planning permit, it is not necessary to decide whether the approach applied by the Tribunal in *Thirteenth Beach* should be followed: i.e. that in the absence of a separate planning permit trigger, the Tribunal need not make any formal finding in respect of planning matters. The EPA submits that, whether or not there is a permit trigger, there is no need for a "formal finding" but, in both instances, the planning scheme (including the policy framework) is relevant to the overall discretion being exercised.
75. Given the discretionary character of the planning scheme itself, it is an open question what weight the Tribunal should give to any particular element of the scheme (especially when it is not deciding in its capacity as a planning decision-maker).
76. With respect to the zone and overlays, the EPA accepts that the Special Use Zone encourages the use of the site for industrial purposes connected with brown coal and notes that the Environmental Significance Overlay is concerned only with buffer distances to protect residences from incompatible industrial activity (and vice versa). As site suitability is not an issue, the only questions which appear to arise for the Tribunal from the zone and overlay requirements are (a) whether the land use strategy indicated by the zone means that the Tribunal should lean towards approving a brown coal-related use; and (b) whether encroachment into the buffer – which may be authorised under a planning permit - is in its view acceptable from the perspective of environmental impacts.
77. In the EPA's submission, it cannot be said that the Tribunal ought not authorise a syngas facility at the site nor that encroachment into the buffer of itself creates unacceptable environmental impacts.

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<sup>24</sup> Negri, expert witness statement, DGA.200.140

<sup>25</sup> EPA, legal submissions dated 26 August 2011, EPA.150.035; EPA, legal submissions dated 30 September 2011, EPA.150.043

78. Leaving aside the particular provisions, which have very little influence on the strategic aspects of the decision the Tribunal must make, the remaining elements of the scheme which the Tribunal must take into account are the State Planning Policy Framework (SPPF) and other aspects of the Local Planning Policy Framework (LPPF).

## 7.2 State Planning Policy Framework (SPPF)

79. The following clauses of the SPPF are directly relevant to the DGDP:

(a) **Clause 13 – Environmental Risks**

Clause 13 states that planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards; and, that planning should identify and manage the potential for the environment, and environmental changes, to impact upon the economic, environmental or social well-being of society.

Sub-clauses 13.04-1 and 13.04-2 set out, respectively, objectives and strategies for the control of noise effects on sensitive land uses and the protection and improvement of air quality. It states that, in applying the policy, guidance is to be taken from the following:

- *Interim Guidelines for Control of Noise from Industry in Country Victoria (Environment Protection Authority, 1989) (now superseded by the Noise from Industry in Regional Victoria Guidelines<sup>26</sup>);*
- *State Environment Protection Policy (Air Quality Management);* and
- *Recommended Buffer Distances for Industrial Residual Air Emissions (Environment Protection Authority, 1990) in assessing the separation between land uses that reduce amenity and sensitive land uses.*

These are all policies or guidance issued by the EPA which it has applied in accordance with the EP Act.

(b) **Clause 17 – Economic Development**

Clause 17 states that planning is to provide for a strong and innovative economy, where all sectors of the economy are critical to economic prosperity; and that planning is to contribute to the economic well-being of communities and the State as a whole by supporting and fostering economic growth and development by providing land, facilitating decisions, and resolving land use conflicts, so that each district may build on its strengths and achieve its economic potential.

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<sup>26</sup> Noise from Industry in Regional Victoria: recommended maximum noise levels from commerce, industry and trade premises in regional Victoria, EPA.050.1466

One of the key components of Clause 17 is the “Industry” sub-clause at 17.02 which (among other things) aims to create opportunities for innovation and the knowledge economy within existing and emerging industries.

These objectives encourage the Tribunal to give weight to the innovative character of syngas technology and the potential economic value of the DGDP to the economy and the region.

80. As always with the SPPF, the relative weight to be accorded to these is discretionary and is analogous to the principle of integration of economic, social and environmental considerations. Each element must be taken into account, but the outcome will depend on the Tribunal’s collective perception of their relative importance.
81. Other clauses of the SPPF are only peripherally relevant (if at all).

### **7.3 Local Planning Policy Framework (LPPF)**

82. The Latrobe Planning Scheme does not include any Local Planning Policies. However, a number of elements of the Municipal Strategic Statement (**MSS**) within the LPPF are relevant to the DGDP. These include:

(a) **Clause 21.01 – Municipal Profile**

The Municipal profile recognises the region’s long standing electricity generation industry sector as one of its key strengths and a major determinant of its workforce. Electricity generation as a whole is stated to contribute 26% to the municipality’s gross revenue, with most (but not all) of it based on local brown coal resources.

Latrobe City is described as Victoria’s powerhouse, providing 85% of the state’s base load electricity, and, as an internationally famous, world-class centre of excellence in brown coal mining attracting multi-million dollar investments, including in clean coal technology.

(b) **Clause 21.03 – Natural Environmental Sustainability**

Clause 21.03-1 requires Council to make decisions on planning applications in accordance with the following vision:

- *To promote the responsible and sustainable care of our natural environment for the use and enjoyment of the people who make up the vibrant community of Latrobe Valley.*
- *To responsibly manage the natural environment, to ensure its sustainability and diversity for the community.*

Relevant natural environmental sustainability objectives and strategies specified in clause 21.03 are:

- to maintain and improve the ecological integrity of natural and artificial systems such as agriculture, forestry and urban areas by (among other things) adopting precautionary behaviour where there are possible or identified threats of serious or irreversible environmental damage (clause 21.03-2).
- to reduce pollution from local domestic, transport and industry sources by (among other things) supporting the development and implementation of new technology designed to reduce greenhouse gas emissions (clause 21.03-4).

(c) **Clause 21.05 – Main Towns**

The Specific Main Town Strategies for Morwell at clause 21.05-5 and the Morwell Structure Plan do not specifically contemplate new or expanded industrial uses on the site. The site is included within buffer land in the Structure Plan and one of the objectives of clause 21.05-2 is to reduce industrial-residential land use conflicts. This clause should be balanced with clause 21.07-4 (noted below) which supports the development of buffer land for uses complementary to coal production.

(d) **Clause 21.07 – Economic Sustainability**

Clause 21.07-1 requires Council to make decisions on planning applications in accordance with the following vision:

- *to provide leadership and to facilitate a well connected, inter-active economic environment in which to do business.*
- *to facilitate a vibrant and dynamic economic environment.*

The Economic Sustainability Overview at clause 21.07 states that investment in the energy sector is a target in the municipality's *Economic Development Strategy* (revised 2007). The City's extensive supplies of brown coal, access to natural gas and secure water supply are expected to continue to ensure economic stability in the years ahead, provided they are well managed. Latrobe City's economic stability is stated to be founded equally on its abundant natural resources, and innovation, which continue to attract new investment, businesses and industries.

Various economic sustainability, coal resource, coal buffer and industry objectives and strategies are specified in clause 21.07. These are largely

directed towards coal exploration and extraction processes, but they do interact with coal use for energy production purposes and include:

- to facilitate a vibrant and dynamic economic environment by providing a balanced approach to economic development taking into account economic, social and environmental values (clause 21.07-2);
- to provide for uses and developments which are compatible to coal development and ancillary services within the buffer area by (among other things) ensuring that any use or development in a buffer area is undertaken in a manner which minimises the potential impacts from sources, including, earth subsidence, noise, dust, fire hazard and visual intrusion associated with open cut mining (clause 21.07-4); and
- to maximise the potential for new industry particularly that may benefit from the coal and electricity industry by (among other things) promoting and supporting the development of existing and new industry, and infrastructure to enhance the social and economic wellbeing of the Latrobe City (clause 21.07-7).

83. Other elements of the MSS touch on issues relevant to the DGDP, including clause 21.03-5 dealing with water quality and quantity and clause 21.03-6 dealing with waste management.

84. From these it is evident that the planning scheme supports continued exploitation of the coal resource for electricity generation and sees coal-based industry as the anchor-point of the local economy. It also links the continuity of the coal industry with the social well-being of the community.

85. These are factors which support approval of the project, subject to the counterpart objectives of environmental sustainability also being adequately addressed.

86. There is nothing in all this which can be said to enlighten the case over and above, or from a different perspective than, the competing considerations which are already before the Tribunal.

#### **7.4 Seriously entertained planning scheme amendments**

87. With respect to the section 37A(b) EP Act consideration, to the best of our knowledge there are no planning scheme amendments currently being progressed which have the potential to affect this land.

## 7.5 Section 173 agreement registered over the land

88. With respect to the section 37A(d) EP Act consideration, to the best of our knowledge there is no section 173 agreement registered over the land.

## 8 SEPPs and WMPs

89. With respect to the section 37A(c) EP Act considerations, the key SEPP/WMPs of direct relevance to the matters under review are SEPP (Air Quality Management) (**SEPP (AQM)**)<sup>27</sup> and SEPP (Control of Noise from Commerce Industry and Trade) No. N-1 (**SEPP N-1**)<sup>28</sup>.

### 8.1 SEPP (AQM)

90. SEPP (AQM) has three stated aims (set out in clause 6) which can be summarised as:
- (a) achieving the environmental quality objectives of SEPP (Ambient Air Quality)<sup>29</sup>, which in turn generally seek to deliver an ambient air quality that protects beneficial uses;
  - (b) driving continuous improvement in air quality; and
  - (c) supporting other measures to address the greenhouse effect and depletion of the ozone layer.
91. These aims are sought to be achieved through the detailed requirements of SEPP (AQM), including requirements to:
- (a) design new sources of emissions which meet specified design criteria for certain types of emissions (clause 10 and Schedule A); and
  - (b) adopt best practice in the management of emissions (clauses 18(3)(c) and/or 19(1)).
92. Clause 13(1) of SEPP (AQM) requires the EPA and other authorities, when making decisions that may affect air quality in Victoria, to apply:
- (a) the principles and pursue the aims and intent of the policy; and
  - (b) any national measures, policies or strategies adopted by Victoria that are relevant to air quality management.
93. “The principles” referred to in (a) are the principles of environment protection which are replicated in SEPP (AQM) at clause 7, identified as “Policy Principles”.

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<sup>27</sup> State Environment Protection Policy (Air Quality Management), EPA.050.050

<sup>28</sup> State Environment Protection Policy (Control of Noise from Commerce Industry and Trade) No N-1, EPA.050.167

<sup>29</sup> State Environment Protection Policy (Ambient Air Quality), EPA.050.102

94. Clause 33(3) requires the EPA to apply any protocols relating to greenhouse gas (**GHG**) emissions that it has developed to generators of emissions subject to works approvals.
95. The *Protocol for Environmental Management: Greenhouse Gas Emissions and Energy Efficiency in Industry (Greenhouse PEM)* is an incorporated document of SEPP (AQM) and provides guidance for businesses on SEPP (AQM) and its requirements for the management of greenhouse gas emissions and energy consumption<sup>30</sup>. The Greenhouse PEM is discussed in 9.3 of these submissions.

## 8.2 SEPP N-1

96. The DGDP site is not within the area directly covered by SEPP N-1 and noise issues are addressed through “guidance” published by the EPA. This guidance – *Noise from Industry in Regional Victoria* guidelines (**NIRV**)<sup>31</sup> – adopts the SEPP N-1 procedures for determining recommended noise limits in Major Urban Areas<sup>32</sup>. Although the DGDP is not located in a Major Urban Area, the Major Urban Area criteria apply.
97. Under SEPP N-1, noise limits are set by determining the background level and zoning level for identified noise sensitive areas<sup>33</sup>. Background levels are determined for day, evening and night periods<sup>34</sup>. These levels are then compared to the respective zoning level. If background levels are higher or lower, then the noise limit is adjusted accordingly, otherwise the noise limit for each period is the zoning level<sup>35</sup>.
98. Subsection 2.2 of NIRV explains how the effects of multiple current and future industrial noise contributors are to be taken into account<sup>36</sup>:

Consistent with the requirements of SEPP N-1, clause 18, the recommended levels apply to the total of all industrial noise emissions affecting a noise-sensitive area. A site may need to meet lower levels when more than one industry contributes or will contribute to the total noise level affecting a noise-sensitive area. See the Applying NIRV guide, section 5.

99. In referring to industries which “will” contribute to the total noise level, subsection 2.2 clarifies an area of silence in clause 18.
100. Section 5 of *Applying NIRV to Proposed and Existing Industries (Applying NIRV)* states further that in Major Urban Areas (which applies to the DGDP)<sup>37</sup>, “a lower

<sup>30</sup> EPA, Protocol for Environmental Management: Greenhouse Gas Emissions and Energy Efficiency in Industry, EPA.050.244 at EPA.050.247 (paragraph 1.1)

<sup>31</sup> Noise from Industry in Regional Victoria: recommended maximum noise levels from commerce, industry and trade premises in regional Victoria, EPA.050.1466. Explanatory notes were also published: EPA, SEPP N-1 and NIRV Explanatory Notes, EPA.050.1481; as well as a guidance document: Applying NIRV to Proposed and Existing Industry, EPA.050.1516

<sup>32</sup> NIRV, EPA.050.1466 at EPA.050.1466 (figure 1)

<sup>33</sup> SEPP N-1, EPA.050.167 at EPA.050.168 (clause 11)

<sup>34</sup> SEPP N-1, EPA.050.167 at EPA.050.177 (schedule C)

<sup>35</sup> SEPP N-1, EPA.050.167 at EPA.050.173 (schedule B1)

<sup>36</sup> NIRV, EPA.050.1466 at EPA.050.1470

designed noise level may be warranted... given the likely larger number of industrial noise sources” and refers to a formula for calculating the degree of “penalty” that should be applied<sup>38</sup>.

101. In the Joint Expert Report, Dr Broner ventures his opinion that the restrictive terms of clause 18 prevail over NIRV<sup>39</sup>. This is incorrect given that SEPP N-1 only applies through NIRV and NIRV is explicit about the need to make provision for future industry.
102. Applying NIRV also provides that, in relation to Major Urban Areas, a new proposal that will not be able to achieve the recommended noise levels should not be approved<sup>40</sup>. There is one caveat, and that is where the regulator considers that rural infrastructure or resource-based constraints mean the recommended levels cannot be met. In these cases, the EPA should be consulted on how to manage the proposal.
103. Section 4.2 of Applying NIRV provides that, before deciding whether to approve an industry proposal that cannot meet recommended noise levels, a regulator should satisfy itself that the industry has<sup>41</sup>:
  - reduced noise as far as practicable;
  - demonstrated a net benefit for the proposal;
  - explored alternative outcomes with the community to address the noise risks; and
  - proposed measures to address the residual noise risks.
104. Whilst it is not certain that section 4.2 applies in the context of Major Urban Areas, it is likely that the discretion under the caveat is guided by these considerations.

## 9 Elements of SEPP (AQM)

### 9.1 Aims, principles and intent

105. Counsel for Dual Gas contends that only part of SEPP (AQM) is intended to be regulatory, referring specifically to the requirement in section 18(1)(e) of the EP Act for SEPPs to include a program for achieving environmental quality objectives which may include the specification of maximum quantities and qualities of waste to be discharged to the environment<sup>42</sup>. He contends that other aspects of the policy are “aspirational”, including the aims, principles and intent of the policy<sup>43</sup>. It also appears that he will

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<sup>37</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1531

<sup>38</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1531

<sup>39</sup> Broner and Nancarrow, joint expert report (section 5.1)

<sup>40</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1522 (part 3.3)

<sup>41</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1525

<sup>42</sup> Dual Gas, opening submissions, P589 L12-17

<sup>43</sup> Dual Gas, opening submissions, P588 L21-28 and P589 L9-10

contend that, as long as the design criteria and emission limits are met, the proposal will not be inconsistent with the SEPP<sup>44</sup>.

106. This distinction between “regulatory” and “aspirational” aspects of SEPP (AQM) is helpful to Counsel for Dual Gas in dispensing with the requirement on the EPA (and now the Tribunal) to apply the principles and pursue the aims and intent of the policy<sup>45</sup> and to ensure that the best practice requirement is satisfied, but it is not tenable.
107. The policy as a whole is to be administered in accordance with the ‘policy intent’, which has three limbs: (i) ensuring that Victoria’s air quality goals and objectives are met, (ii) driving continuous improvement in air quality and achieving the cleanest air possible having regard to the State’s social and economic development, and (iii) supporting Victorian and national measures to address the enhanced greenhouse effect and depletion of the ozone layer.
108. It is clear from clause 13(1)(a) of SEPP (AQM) that the Tribunal must pursue the ‘policy intent’ of SEPP (AQM) when determining the applications for review<sup>46</sup>.
109. Just as the intention to protect beneficial uses is implemented by the design criteria in Schedule A and the emission limits in Schedule E, other elements of the policy intent are implemented by measures and requirements in other parts of the SEPP (AQM).
110. Paragraph 6 of the commentary to Schedule A, for example, provides that “All emissions of pollutants covered by SEPP (AQM) must be managed to ensure that the beneficial uses identified in Clause 9 of this Policy are protected *and that continuous improvement in Victoria’s air quality is achieved*”<sup>47</sup> (our emphasis).
111. These beneficial uses are set out in clause 9(1) as<sup>48</sup>:
- life, health and well-being of humans;
  - life, health and well-being of other forms of life, including the protection of ecosystems and biological diversity;
  - local amenity and aesthetic enjoyment;
  - visibility;
  - the useful life and aesthetic appearance of buildings, structures, property and materials; and
  - climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biological diversity.

<sup>44</sup> Denison, cross-examination, P1571 L1-12

<sup>45</sup> See: SEPP (AQM), EPA.050.050 at EPA.050.055 (clause 13(1)(a))

<sup>46</sup> See: SEPP (AQM), EPA.050.050 at EPA.050.055

<sup>47</sup> SEPP (AQM), EPA.050.050 at EPA.050.075

<sup>48</sup> SEPP (AQM), EPA.050.050 at EPA.050.054

112. It also says that “Regardless of the classification of a pollutant all emissions must be minimised by the use of best practice as described in Clauses 18 and 19 of this Policy”.<sup>49</sup>
113. Clauses 18(3)(c) and 19(1) require generators of emissions to apply best practice to the management of emissions and “best practice” is defined for these purposes.<sup>50</sup>
114. Clause 7 provides that the policy is guided by the principles of environment protection set out in that clause (which substantively replicate the principles in section 1A of the EP Act).<sup>51</sup>
115. Finally, clause 13(1) provides that, when making decisions that may affect air quality in Victoria, the EPA will apply the principles of environment protection and pursue the aims and intent of the policy.<sup>52</sup>
116. It is difficult to see why these should be regarded as any less “regulatory” than the design criteria or emission limits. In particular, why the principles replicated in SEPP (AQM) should be considered any less binding than they are in the EP Act.
117. Counsel for Dual Gas simply cannot say, based on their qualitative rather than quantitative nature, that the requirement to apply the principles and pursue the aims and intent of the policy, and to apply “best practice”, proclaimed as part of the SEPP (AQM), are not “regulatory” to the same degree as any other part of the SEPP (AQM).
118. There must be compliance with the requirements of SEPP (AQM) which address the policy aims and intent beyond the protection of beneficial uses. That they are “beyond” – ie. in addition to and not embodied in – the design criteria and emission limits is evident from the separate elements of the policy aims and intent, their flow-through into clauses which are quite separate from the design criteria and emission limits (eg. clauses 13(1), 18, 19 and 33) and (as referenced above) explicit statements requiring emissions to be “minimised” through best practice “regardless of the classification of a pollutant”.

## 9.2 Design criteria to protect beneficial uses

119. Section 18 of the EP Act provides that:

State environment protection policy shall establish the basis for maintaining environmental quality sufficient to protect existing and anticipated beneficial uses in the area affected by the Order and in particular shall include in terms

<sup>49</sup> SEPP (AQM), EPA.050.050 at EPA.050.075 (paragraph 6 of schedule A)

<sup>50</sup> SEPP (AQM), EPA.050.050 at EPA.050.058

<sup>51</sup> SEPP (AQM), EPA.050.050 at EPA.050.052-054

<sup>52</sup> SEPP (AQM), EPA.050.050 at EPA.050.055-056

sufficiently clear to give an adequate basis for planning and licensing functions' the matters then itemised. These matters are:

- (a) the boundaries of any area affected;
- (b) identification of the beneficial uses to be protected;
- (c) selection of the environmental indicators to be employed to measure and define the environmental quality;
- (d) a statement of the environmental quality objectives (where practicable);
- (e) the program if any by which the stated environmental quality objectives are to be attained and maintained including, where appropriate, the specification of -
  - (i) maximum quantities and qualities of waste permitted to be discharged to the environment;
  - (ii) maximum levels of noise permitted to be emitted to the environment;
  - (iii) minimum standards for the installation and operation of works or equipment for the control of waste or noise from specified sources or classes of premises; and
  - (iv) measures designed to minimise the possibility of the occurrence of pollution.

120. Clause 11 of SEPP (AQM) nominates the ambient air quality objectives in the SEPP (AAQ) as its environmental air quality objectives pursuant to section 18(1)(d) of the EP Act<sup>53</sup>.

121. To achieve these objectives, SEPP (AQM) provides for the establishment of design criteria for pollutants that have been classified as Class 1, 2 or 3 indicators. These design criteria are set out in Schedule A of SEPP (AQM) and were based on 2001 understanding of the health effects of the pollutants to "ensure" that the beneficial uses of the environment set out in clause 9 of the SEPP (AQM) are protected<sup>54</sup>.

### 9.3 Best practice

122. The next issue is what is meant by "best practice".

123. Dual Gas says that as long as the DGDP has lower emissions than other brown coal fuelled power plants Dual Gas has satisfied its obligation to apply best practice.

124. Both Environment Victoria (**EV**)/Locals into Victoria's Environment (**LIVE**) and Mr Shield say that Dual Gas could only satisfy its obligation to apply best practice if it

<sup>53</sup> SEPP (AQM), EPA.050.050 at EPA.050.055

<sup>54</sup> SEPP (AQM), EPA.050.050 at EPA.050.075 (paragraph 4 of schedule A)

proposed a plant that generates power from renewable energy or solely from natural gas<sup>55</sup>.

125. The EPA submits that best practice requires an assessment of the individual components and processes that make up the overall DGDP to determine whether there are additional or alternative techniques, methods, processes or technology that could or should be adopted to minimise the emissions from the project.

### ***Relevant definitions***

126. Best practice is defined in SEPP (AQM) as:
- the best combination of eco-efficient 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<sup>56</sup>.
127. The word “eco-efficient” is defined as “producing more goods and services with less energy and fewer natural resources, resulting in less waste and pollution”<sup>57</sup>.
128. The Greenhouse PEM includes the following guidance on the interpretation of “best practice” under SEPP (AQM)<sup>58</sup>:
- (a) Expectations with respect to the adoption of best practice by individual businesses will depend on technical, logistical and financial considerations.
  - (b) Technical and logistical considerations include a wide range of issues that will influence the practicality of different technologies and practices. For example, whether a particular technology is compatible with an enterprise’s existing production processes.
  - (c) In relation to GHG emissions, financial feasibility will be considered on a case-by-case basis through discussions between the licence holder and the EPA.
  - (d) In assessing best practice, a range of environmental issues, in addition to GHG emissions and energy efficiency, will often also need to be considered. In the event that potential conflicts between these issues are identified, this will need to be discussed with EPA’s client manager and a preferred approach agreed.
129. Although the Greenhouse PEM only applies to GHG emissions, the EPA accepts that the need to consider the cost and practicality of different options applies equally to the application of best practice to the management of other emissions.

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<sup>55</sup> EV/LIVE, Amended Further and Better Particulars, EVL.360.038 at EVL.360.039 (paragraph 5); Shield, Further and Better particulars in response to Order 16 of the Tribunal’s Orders of 19 July 2011, MSH.560.021 at MSH.560.023 (paragraph 2)

<sup>56</sup> SEPP (AQM), EPA.050.050 at EPA.050.064 (part IV)

<sup>57</sup> SEPP (AQM), EPA.050.050 at EPA.050.065 (part IV)

<sup>58</sup> EPA, Greenhouse PEM, EPA.050.244 at EPA.050.248

130. SEPP (AQM) provides at clause 18(1) that the “management of emissions” means:
- (a) avoiding and minimising emissions in accordance with the preference established in the principle of the wastes hierarchy; and
  - (b) the assessment, monitoring, control, reduction or prohibition of emissions for air quality management purposes<sup>59</sup>.
131. The requirement for a new emitter to apply best practice to the management of its emissions is contained in clause 19(1) of SEPP (AQM)<sup>60</sup>. Clause 33(1) of SEPP (AQM) specifically provides that this requirement applies to generators of GHG emissions<sup>61</sup>.
132. Although the Greenhouse PEM provides some general guidance, it does not definitively set out what best practice requires in the context of this particular proposal.

### ***Benchmarking***

133. The debate before the Tribunal regarding best practice has focused on identifying the relevant industry sector primarily for the purpose of benchmarking the emissions from the DGDP against others in that industry sector.
134. The EPA agrees that in many circumstances benchmarking will provide a useful indication as to whether the emissions from a particular proposal could feasibly be reduced.
135. However, benchmarking is only instructive when there are direct industry equivalents – that is, the opportunity to compare apples with apples. For projects based on new technology which have no direct counterpart, like the DGDP, benchmarking does not provide a reliable indication of whether the proponent is applying best practice to the management of its emissions.
136. The EPA agrees with Dual Gas that the DGDP compares favourably with existing brown coal fired power stations in terms of emissions. However, the fact that the DGDP is expected to produce lower emissions than traditional brown coal fired power stations does not automatically mean that Dual Gas has satisfied its obligation to apply best practice to the management of the emissions from the DGDP. In one sense, in this era of innovation, it could be argued with force that achieving lower emission rates than that characteristic of existing brown coal-fired power stations should be seen as simply the starting point, or achieving the bare minimum.

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<sup>59</sup> SEPP (AQM), EPA.050.050 at EPA.050.057

<sup>60</sup> SEPP (AQM), EPA.050.050 at EPA.050.058

<sup>61</sup> SEPP (AQM), EPA.050.050 at EPA.050.061

### ***The EPA's interpretation of the requirement to apply best practice***

137. In the EPA's submission, in order to determine whether Dual Gas is proposing to apply best practice to the management of the emissions from the DGDP, the Tribunal must determine whether there is a better combination of eco-efficient techniques, methods, processes or technology used in an industry sector or activity that would reduce emissions from the DGDP and that could practically be adopted by Dual Gas.
138. This involves assessing the potential addition of "end of pipe" technology to treat or capture emissions as well as potential additional or alternative techniques, methods, processes or technology that would reduce the generation of emissions in the first instance.

### ***The relevant industry sector or activity***

139. The techniques, methods, processes or technology which must be taken into account are those which are "used in an industry sector or activity". The key question is how widely an industry "sector" should be defined in this case - should it be defined widely as the generation of electricity, or more narrowly as the generation of base-load electricity, the generation of electricity from brown coal, the generation of electricity from brown coal in a combined cycle system, or the generation of electricity from natural gas?
140. There is no definition of "industry sector" in SEPP (AQM). The definition of "sector" in the Macquarie Concise Dictionary<sup>62</sup> is "any field or division of a field of activity". This suggests that the Tribunal has a considerable amount of discretion in determining the breadth of the industry "sector" in this case.
141. The matter is complicated further by the reference to "industry sector *or activity*" (our emphasis). This may have been included to cater for situations where there is no relevant industry sector or where a technique etc is not used in the relevant industry sector but is used in similar activities in other industry sectors.
142. Mr Shield argues that because section 49AB of the EP Act defines "member of an industry" in terms of the product or services it produces the relevant industry sector in which the DGDP must be considered is "electricity generation"<sup>63</sup>. However, this definition is limited to Division 1A of Part IX of the EP Act (Sustainability Covenants), and therefore should not be applied when determining the appropriate industry sector or activity in the context of "best practice" in SEPP (AQM).

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<sup>62</sup> Macquarie Concise Dictionary, Macmillan, Fifth Edition, 2009

<sup>63</sup> Shield, Further and Better Particulars in response to Order 16 of the Tribunal's Orders of 19 July 2011, MSH.560.021 at MSH.560.023 (paragraph 2.1(b))

143. The EPA submits that when determining the relevant industry sector or activity for the DGDP, the Tribunal should identify the industry sector or activity that most closely aligns with the proposal – in this case, generating electricity from brown coal (with respect to the syngas aspect of the proposal) and generating electricity from natural gas (with respect to the natural gas aspect of the proposal). Mr Tsesmelis<sup>64</sup> and Mr McIntosh<sup>65</sup> both agree that these are the two relevant industry sectors when considering the application of best practice in this case. Also, Doctors for the Environment Australia (**DEA**) agrees that best practice should be expanded to take into account the natural gas industry sector<sup>66</sup> (although the EPA disagrees with their wider submission that all processes for generating electricity should have been examined and compared<sup>67</sup>).
144. "An industry sector or activity" is not geographically confined. It includes industry sectors and activities locally, regionally, nationally and internationally. Therefore, techniques etc used in the relevant industry sector overseas should be considered.
145. It is important to note also that the techniques, methods, processes or technology must be used in an industry sector or activity at the time the best practice assessment is undertaken. Potential alternative technology cannot be speculative. This means that Professor Outhred's concept of "best practice innovation"<sup>68</sup> is not applicable to the interpretation of best practice in the context of SEPP (AQM). However, this does not mean that best practice is static. On the contrary, when new plant is to be installed best practice requires the latest most innovative technology that is available at that time to be embraced.

*The extent of the best practice obligation*

146. As set out above, the EPA submits that the requirement to apply best practice to the management of emissions is limited to considering changes to techniques, methods, processes or technology that could practically be adopted to reduce emissions from a proposal. The application of best practice focuses on design detail and how a proponent is intending to undertake its particular proposal. It does not extend to considering, or requiring, fundamentally different proposals.
147. For example, it could not be said that Dual Gas has not applied best practice to the management of the emissions from the DGDP simply because it is proposing to generate electricity from brown coal rather than from renewable energy or solely from natural gas.

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<sup>64</sup> Tsesmelis, expert witness statement by way of reply, EPA.100.507 at EPA.100.510 (paragraph 20)

<sup>65</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.503 (paragraphs 50 and 68)

<sup>66</sup> DEA, opening submissions, P596 L30-P597 L3

<sup>67</sup> DEA, opening submissions, P597 L4-8

<sup>68</sup> Outhred, examination, P1095, L9-30

148. It appears that EV/LIVE will submit that the application of best practice does require consideration of fundamentally different proposals. In his opening submissions, Counsel for EV/LIVE stated that “the policy framework wants its decision makers to ask the question, is this the best way that electricity can be produced in this day and age in this location”<sup>69</sup>.
149. As the Tribunal has already highlighted<sup>70</sup>, such an interpretation would be unworkable as there would either only be one “best practice” form of electricity generation (ie. renewable energy) or there would be great uncertainty as to where to draw the line between electricity generation that is “best practice” and electricity generation that is not.
150. Although Professor Outhred’s evidence initially appeared to be that the DGDP is not best practice because it would have a higher greenhouse emissions intensity than either combined cycle gas or renewable energy generation (both technologies deployed in the National Electricity Market)<sup>71</sup>, he conceded in cross-examination that the concept of best practice “includes judgement”<sup>72</sup>, is not “unrealistic practice”<sup>73</sup> and he is not suggesting that “we would have only wind or only nuclear”<sup>74</sup>. After agreeing that the current contributors to the National Electricity Market include the full gamut of electricity generation, Professor Outhred stated that “I don’t think anyone, and certainly not myself, is arguing that we will...preclude all so called dirty technologies just because they’re dirty because...we will have a practical compromise”<sup>75</sup>.
151. This does not mean that all proposals to generate electricity from brown coal will be approved just because they are “best practice” in an emissions intensive industry sector or activity. Even if the best practice requirement is satisfied, there are broader requirements that govern whether proposals which will result in certain levels of emissions are acceptable (eg. the application of the principles of environment protection, any applicable emission limits). A works approval application which is “best practice” for an emissions intensive industry sector or activity may still be refused on other grounds if it is considered to be environmentally unacceptable. In these circumstances, the works approval application could be refused on the basis of Counsel for EV/LIVE’s “broader policy paradigm which is that production of energy in that way is a bad thing for the environment”<sup>76</sup>, not on the basis of “best practice”.

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<sup>69</sup> EV/LIVE, opening submissions, P646 L31-P647 L3

<sup>70</sup> EV/LIVE, opening submissions, P642 L14-21 and P643 L11-P644 L8

<sup>71</sup> Outhred, examination, P1094 L14-22

<sup>72</sup> Outhred, cross-examination, P1108 L12

<sup>73</sup> Outhred, cross-examination, P1108 L13

<sup>74</sup> Outhred, cross-examination, P1108 L6-8

<sup>75</sup> Outhred, cross-examination, P1109 L2-6

<sup>76</sup> EV/LIVE, opening submissions, P650 L21-23

*Whether a holistic approach is sufficient*

152. Counsel for Dual Gas submitted in opening that best practice “requires one to look at the whole process”<sup>77</sup>, not at every element of the process.
153. This argument was furthered by Dr Bellair, who stated that the DGDP “should be considered holistically under [clause 19(1)]... rather than considering each component of the plant individually”. He said that “the latter approach could potentially result in a miss-match (*sic*) of technologies, leading to a sub-optimal outcome”<sup>78</sup>. In cross-examination, he clarified that considering the project “holistically” means “it’s a box, brown coal goes in, electricity comes out”<sup>79</sup>.
154. The EPA disputes Dual Gas’s submission that “best practice” under the SEPP (AQM) does not allow for the consideration of the individual components which make up a project. Taking Dr Bellair’s “top class car” analogy<sup>80</sup>, if a Mercedes will emit 3.2 million tCO<sub>2</sub>-e/year and changing its gearbox would demonstrably reduce those emissions, why should that not be required if it is practicable?
155. Unless a component-based approach is adopted, there is a risk of overlooking potential process or technology alternatives that could reasonably be adopted and would reduce emissions further. Such an outcome would be inconsistent with the aim of the SEPP (AQM) to drive continuous improvement in air quality and achieve the cleanest air possible in Victoria.
156. Compatibility is obviously a relevant consideration and is embodied in the term “*best combination*” of techniques etc (our emphasis).
157. However, this simply means that the assessment of individual components must have an eye to compatibility. Mr Tsesmelis in his reply to Dr Bellair<sup>81</sup> stated that:

The starting point in any technology evaluation and best practice assessment is to analyse and consider the individual components and parts that make up the overall process or configuration. This approach helps to identify synergies between components and facilitates a holistic assessment of the overall facility.

By considering individual components, alternatives can be considered and the best combination of techniques assessed and evaluated. For example, as noted at paragraph 2 and 65 of my Expert Witness Statement, other gasifier options including entrained-flow gasifiers may be possible as the best technology gasifier for generating power from Victorian brown coal with the lowest environmental

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<sup>77</sup> Dual Gas, opening submissions, P588 L6-7

<sup>78</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.046 (section 3.2.1)

<sup>79</sup> Bellair, cross-examination, P1702 L27-28

<sup>80</sup> Bellair, examination, P1675 L3-8

<sup>81</sup> Tsesmelis, expert witness statement by way of reply, EPA.100.507 at EPA.100.511 (paragraphs 22-23)

impacts... The resulting overall holistic assessment of an alternative gasifier technology coupled to a CCGT train (or trains), having considered the individual components, could represent better technology than the HRL gasifier coupled to a CCGT train (or trains).

*The difference between the requirement to apply best practice and the requirement to reduce emissions to the maximum extent achievable*

158. New emitters of Class 3 indicators must not only apply best practice to the management of those emissions, they must also reduce those emissions to the maximum extent achievable (**MEA**)<sup>82</sup>.
159. A Class 3 indicator is “a waste which is an extremely hazardous substance that may threaten the beneficial uses of the air environment due to its carcinogenic, mutagenic, teratogenic, highly toxic or highly persistent characteristics”<sup>83</sup>.
160. MEA means “a degree of reduction in the emission of wastes from a particular source that uses the most effective, practicable means to minimise the risk to human health from those emissions and is at least equivalent to or greater than that which can be achieved through the application of best practice”<sup>84</sup>.
161. Given that practicability is still a consideration, the line between what is required to satisfy best practice and what more is required to satisfy MEA is not altogether clear.
162. The Explanatory Notes to SEPP (AQM) seek to clarify the difference between the two requirements<sup>85</sup> –

The expectation for reduction of emissions of Class 3 indicators to the maximum extent achievable imposes a higher expectation for emissions reduction than the expectation for reduction of emissions of Class 1 and 2 indicators (which is through the application of best practice). Best practice reflects the best combination of eco-efficient techniques, methods, processes or technology that apply across an industry, whereas reduction to the maximum extent achievable focuses on what is most effective and practicable for an individual premises. This may include innovative and new approaches. Reduction to the maximum extent achievable may be equivalent to application of best practice within an industry, but it may also go beyond that.

163. This is reflected in the Mining and Extractive Industries Protocol for Environmental Management<sup>86</sup> (issued under SEPP (AQM)) (**Mining PEM**), which provides that:

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<sup>82</sup> See SEPP (AQM), EPA.050.050 at EPA.050.058 (clause 19(2))

<sup>83</sup> SEPP (AQM), EPA.050.050 at EPA.050.065 (part IV)

<sup>84</sup> SEPP (AQM), EPA.050.050 at EPA.050.065 (part IV)

<sup>85</sup> SEPP (AQM), EPA.050.050 at EPA.050.091-092

Generators of emissions of Class 3 indicators must consider opportunities for going beyond what is considered best practice for their premises to demonstrate that the requirement for MEA for control of emissions is being met. This is done by investigating options at each site for further emission reduction such as innovative processes or more stringent housekeeping regimes.

164. Although this does not definitively draw the line between best practice and MEA, it does suggest that more innovative techniques, methods, processes and technology to reduce emissions should be considered when assessing MEA. As a hypothetical example, in this case, if GHG emissions were a Class 3 indicator (which they are not), reducing GHG emissions to MEA might include further investigation of the use of an F class gas turbine for operation on syngas.

*Summary of the EPA's submissions on the interpretation of the best practice requirement*

165. In summary, the EPA submits that the application of best practice, as defined in SEPP (AQM):
- requires an assessment of the individual components and processes that make up the overall DGDP to determine whether there are additional or alternative techniques, methods, processes or technology that could or should be adopted to minimise the emissions from the project. This must be done in light of technical, logistical and financial considerations;
  - requires the alternative techniques, methods, processes etc to be in use in an industry sector or activity (ie. they cannot be speculative);
  - is not limited geographically but applies to an industry sector nationally and internationally;
  - is not necessarily satisfied by compliance with a particular "standard" (eg. the proposed GEI standard of 0.8 tCO<sub>2</sub>-e/MWh) (Dual Gas has confirmed that it agrees – although it is difficult to reconcile that with Dual Gas's submission that the emissions from the DGDP are less than from other brown coal fuelled plants Dual Gas must be applying best practice<sup>87</sup>); and
  - does not involve consideration of, or a requirement to adopt, fundamentally different proposals, such as electricity generation from renewable energy sources rather than coal.

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<sup>86</sup> EPA, Mining and Extractive Industries Protocol for Environmental Management, publication 1191, December 2007, p5 [http://epanote2.epa.vic.gov.au/EPA/publications.nsf/7dd91371df0bd0654a256ce9001f4ac1/d218c109bf0eb75fca257384001aebbd/\\$FILE/1191.pdf](http://epanote2.epa.vic.gov.au/EPA/publications.nsf/7dd91371df0bd0654a256ce9001f4ac1/d218c109bf0eb75fca257384001aebbd/$FILE/1191.pdf)

<sup>87</sup> Dual Gas, opening submissions, P588 L8-13

166. The EPA submits that this is the correct interpretation of “best practice” in SEPP (AQM) for the following reasons:

- (a) The EPA’s interpretation is consistent with the policy aim of the SEPP (AQM) to drive continuous improvement in air quality in Victoria<sup>88</sup>. If the best practice requirement can be satisfied simply by having lower emissions than others in an industry sector, opportunities to reduce emissions further may be overlooked.
- (b) The requirement in clause 19(1) of SEPP (AQM) is that a generator of emissions must apply best practice to the management of emissions. It is not that proposals must be “best practice”.
- (c) The requirement to apply best practice is not only a requirement at the time a works approval application is assessed. It is an ongoing requirement that applies equally to proposed and existing industry. In this context, it has never been interpreted to be something that requires cessation of an activity upon the development of a fundamentally different way in which the same product can be delivered in a more eco-efficient manner. Rather than requiring existing activities to close, the obligation to apply best practice requires existing emitters to adopt new additional or alternative techniques, methods, processes or technology that are developed and would reduce their emissions as far as economically and practically possible<sup>89</sup>.
- (d) The Mining PEM, which was issued 5 years after the Greenhouse PEM, provides more detail on the best practice requirements in the mining context. Although it is not strictly applicable to this project, the Mining PEM illustrates the intended scope of a best practice enquiry. In particular, it provides that in determining what may constitute best practice or MEA for a specific site, the most recent documented definition, expression or application of best practice for the industry sector from national and international sources should be considered (amongst other things) and that various sources should be consulted including overseas sources<sup>90</sup>.
- (e) The EPA’s interpretation is consistent with previous decisions of the Tribunal where the Tribunal has considered the scope of the best practice and MEA requirements under SEPP (AQM).
  - (i) In *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 , the applicant proposed to establish an open air facility for the receipt and processing of construction and

<sup>88</sup> SEPP (AQM), EPA.050.050 at EPA.050.052 and 058 (clauses 6(b) and 18(3)(b))

<sup>89</sup> EPA, Greenhouse PEM, EPA.050.244 at EPA.050.252-255 (section 2.2)

<sup>90</sup> EPA, Mining PEM, publication 1191, December 2007, p5

demolition waste. The Tribunal held that two particular design measures – enclosure of crushing machinery and real-time dust monitoring – represented best practice for the control and management of dust emissions (referring to SEPP (AQM) and the Mining PEM)<sup>91</sup>. In particular, the Tribunal held that the enclosure of the crushing machinery was “a reasonable burden on the operator”<sup>92</sup>. Although the Tribunal recognised that real time monitoring is an emerging technology in this industry, it concluded that “similar systems and equipment have been used in other industries for many years” and, notwithstanding the costs involved, it considered that the technology was crucial<sup>93</sup>.

- (ii) In this case, the best practice measures required by the Tribunal were technical adjustments discussed under the heading “key design and operational requirements”, not fundamental changes to the nature of the proposal.
- (iii) The Tribunal also commented on the requirement in SEPP (AQM) to reduce Class 3 indicators to the MEA, stating that “MEA is at least equivalent to or greater than the reduction that can be achieved through the application of best practice”<sup>94</sup>. Although this case involved the discharge of a Class 3 indicator, no additional control measures were proposed. The Tribunal referred to the fact that the Council “could not suggest measures other than those already described for reducing dust emissions on site”<sup>95</sup>.
- (iv) In *Terminals PL v Greater Geelong CC* (Red Dot) [2005] VCAT 1988 , the Tribunal considered an application to review the grant of a works approval and a failure to grant a planning permit for a butadiene chemical storage facility in Corio.
- (v) The proposal involved various emissions, including butadiene (a Class 3 indicator), and therefore the best practice and MEA requirements in SEPP (AQM) applied.
- (vi) In its decision, the Tribunal referred to the best practice and MEA requirements in the context of design details<sup>96</sup>.

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<sup>91</sup> *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 at [33]

<sup>92</sup> *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 at [36]

<sup>93</sup> *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 at [37]

<sup>94</sup> *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 at [33]

<sup>95</sup> *Deborah Skidmore (City Circle Demolitions Pty Ltd) v Greater Dandenong CC* [2011] VCAT 245 at [33]

<sup>96</sup> *Terminals PL v Greater Geelong CC* (Red Dot) [2005] VCAT 1988 at [120]-[122]

- (vii) The Council argued that the best practice that should be implemented, in the absence of any Australian experience with respect to butadiene storage or a specific butadiene protocol, was international best practice and that such best practice was contained in the US Butadiene Product Stewardship Guidance Manual<sup>97</sup>. In particular, the Council argued that certain aspects of the proposal were inconsistent with that manual, including back up electricity and gas supply, fixed hoses for ship unloading, lack of a vapour return to the ship and venting of safety relief valves to the atmosphere.
  - (viii) The Tribunal did not dismiss that argument on the basis that it was not appropriate to refer to international best practice in the butadiene storage industry sector or on the basis that it was not appropriate to consider different “components” of the proposed activity. Rather, it assessed the requirements under the manual for each of the disputed components and held that the manual requirements were either not appropriate or not warranted in the context of this particular proposal<sup>98</sup>.
- (f) The EPA’s interpretation is consistent with previous Planning Panel decisions where the scope of best practice was considered.
- (i) In the Port Phillip Bay Channel Deepening Environment Effects Statement Volume 1 Panel Report (dated February 2005), the Panel accepted that it is appropriate to compare a proposal to international practice concluding that “[w]here relevant, comparisons are made with global practice examples to assist in determining the degree to which the project utilises best practice”<sup>99</sup>.
  - (ii) In the Murray Basin Mineral Sands- Stage 2 (EES) Inquiry Report<sup>100</sup>, the Inquiry implicitly accepted a component-based approach to the definition of best practice (in the Mining PEM). The EPA had sought further consideration of best practice options for “(a) the... process to be used for the processing of the materials involved; (b) the selected desalination process... and the quality of water needed for the proposed operations; and (c) the transport of... mineral concentrate... and return [transport] of waste...”<sup>101</sup>. The Inquiry’s response was

<sup>97</sup> *Terminals PL v Greater Geelong CC* (Red Dot) [2005] VCAT 1988 at [123]

<sup>98</sup> *Terminals PL v Greater Geelong CC* (Red Dot) [2005] VCAT 1988 at [124]-[130]

<sup>99</sup> Channel Deepening (EES) [2005] PPV 13 at part 10

<sup>100</sup> Murray Basin Mineral Sands – Stage 2 (EES) [2008] PPV 104

<sup>101</sup> Murray Basin Mineral Sands – Stage 2 (EES) [2008] PPV 104 at part 10.2.1

The Inquiry realises that selection of equipment will not just be based on energy considerations but will include other factors such as cost, reliability, performance, availability of existing plant, etc. The proponent's extensive experience of mining minerals sands should be useful in providing the EPA with the information it is seeking about "best practice for energy efficiency"<sup>102</sup>.

- (g) The EPA's interpretation is also consistent with the Energy and Greenhouse Management Toolkit<sup>103</sup> (**Energy and Greenhouse Toolkit**) prepared by the EPA and Sustainability Victoria to assist industry to comply with SEPP (AQM) and to help the EPA comply with the Greenhouse PEM.
- (i) The Energy and Greenhouse Toolkit comprises 7 Modules, one of which focuses on "Best Practice Design, Technology and Management" (Module 5).
  - (ii) The introduction to Module 5 provides that emissions from all inputs, outputs and processes of a facility should be determined. Then best practice technologies and operational procedures should be researched at local and international levels<sup>104</sup>.
  - (iii) It provides guidance for business on the management of energy consumption and greenhouse gas emissions by providing a methodology to assist in identifying potential process and technology improvements.
  - (iv) The methodology has 3 levels of assessment, all of which should be undertaken.
  - (v) First, the overall system specific energy index should be evaluated and compared with world's best practice and any gap analysed. It is acknowledged that this level of assessment can be "fairly crude"<sup>105</sup>. This level is equivalent to Dual Gas's proposed "holistic" assessment of best practice.
  - (vi) Second, a process flow diagram should be developed and the energy performance of each process should be determined and compared to

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<sup>102</sup> Murray Basin Mineral Sands – Stage 2 (EES) [2008] PPV 104 at part 10.3.1

<sup>103</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Management Toolkit, June 2002, <http://www.sustainability.vic.gov.au/www/html/1938-energy-and-greenhouse-management-toolkit.asp>

<sup>104</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p1, <http://www.sustainability.vic.gov.au/resources/documents/Module5.pdf>

<sup>105</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p9

world's best practice. Again, any gaps should be analysed.<sup>106</sup> This is equivalent to the EPA's separate assessment of the "generation of electricity from syngas" process in train 1 and the "generation of electricity from natural gas" process in GT2.

- (vii) Finally, the overall integration of the processes should be analysed, compared to world's best practice and any gaps analysed.<sup>107</sup>
- (viii) It is clear from the case studies provided in Module 5 that where gaps are identified a business should carefully review its techniques, methods, processes or technology to look for potential improvements, including assessing each individual component of the process.
- (ix) For example, a process and energy flow diagram was drawn up for the production of limestone and calcinised lime. It was determined that the calcination kilns used in the process consumed more natural gas and electricity than the current world's best practice for that type of kiln. In that case, the gap was due to a difference in the heat balance between the preheating and calcinising zones of the kilns. Rebalancing the kiln and using variable speed exhaust fans and higher efficiency motors would improve the efficiency of the kiln<sup>108</sup>.
- (x) Module 5 also refers to various information sheets that provide further information on energy saving practices and technologies. These sheets have been prepared on a component basis: for example, there is an information sheet on AC variable speed drives, one on efficient belt drives and one on boiler optimisation<sup>109</sup>.

## 9.4 Management of greenhouse gases

- 167. Clause 33(1) of SEPP (AQM) applies clauses 18 and 19 specifically to generators of emissions of greenhouse gases (adopting, by implication, the previous definition of "generators of emissions")<sup>110</sup>.
- 168. Clause 33(2) states that "Any protocols for environmental management relating to greenhouse gas emissions developed by the Authority in accordance with the policy

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<sup>106</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p5

<sup>107</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p6

<sup>108</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p9

<sup>109</sup> EPA and Sustainability Energy Authority Victoria, Energy and Greenhouse Toolkit, Module 5: Best Practice Design Technology and Management, at p35

<sup>110</sup> SEPP (AQM), EPA.050.050 at EPA.050.062

- will be consistent with any measures developed by the Government of Victoria for the management of greenhouse gases and energy efficiency”<sup>111</sup>.
169. Clause 33(3) states that “The Authority will apply these protocols to generators of emissions subject to works approvals and licences, and in assessing the potential impacts of other development proposals”<sup>112</sup>.
170. The Greenhouse PEM was issued by the EPA under SEPP (AQM). It sets out the steps that businesses need to take to demonstrate compliance with the policy principles and provisions of SEPP (AQM) related to energy efficiency and GHG emissions and how the EPA will assess compliance<sup>113</sup>.
171. In particular, the Greenhouse PEM outlines the procedural steps that new applicants must follow to demonstrate that they have identified and implemented best practice.
172. Firstly, applicants must estimate their annual energy consumption (by energy type) and the associated GHG emissions.
173. Secondly, applicants that will generate non-energy related GHG emissions must estimate the annual levels of such emissions.
174. Thirdly, applicants must identify and evaluate opportunities to reduce GHG emissions, by reducing energy use/improving energy efficiency and/or reducing non-energy related GHG emissions. Regarding non-energy related GHG emissions, the Greenhouse PEM simply states that “applicants will be required to identify and implement best practice with respect to the activities that are the subject of the application”<sup>114</sup>.
175. Finally, applicants must document the first three steps and submit these details to the EPA along with their proposed environmental management procedures and continuous improvement programs.
176. The Greenhouse PEM includes the following guidance on the interpretation of “best practice” under SEPP (AQM)<sup>115</sup>:
- (a) Expectations with respect to the adoption of best practice by individual businesses will depend on technical, logistical and financial considerations.
  - (b) Technical and logistical considerations include a wide range of issues that will influence the practicality of different technologies and practices. For example, whether a particular technology is compatible with an enterprise’s existing production processes.

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<sup>111</sup> SEPP (AQM), EPA.050.050 at EPA.050.062

<sup>112</sup> SEPP (AQM), EPA.050.050 at EPA.050.062

<sup>113</sup> EPA, Greenhouse PEM, EPA.050.244

<sup>114</sup> EPA, Greenhouse PEM, EPA.050.244 at EPA.050.252

<sup>115</sup> EPA, Greenhouse PEM, EPA.050.244 at EPA.050.248

- (c) In relation to GHG emissions, financial feasibility will be considered on a case-by-case basis through discussions between the licence holder and the EPA.
  - (d) In assessing best practice, a range of environmental issues, in addition to GHG emissions and energy efficiency, will often also need to be considered. In the event that potential conflicts between these issues are identified, this will need to be discussed with EPA's client manager and a preferred approach agreed.
177. The Greenhouse PEM also sets out various optional actions that licence holders may consider to reduce GHG emissions, including product stewardship initiatives, reducing third party emissions, consideration of greenhouse impacts of transport use and public environmental reporting.

## **9.5 The policy principles**

178. As noted above clause 7 states that the policy is guided by the principles and clause 13(1) requires a decision maker to apply the principles of environment protection and pursue the aims and intent of the policy.
179. These principles incorporate the principle of integration of economic social and environmental considerations, the precautionary principles, the principle of intergenerational equity, principle of biological diversity and ecological integrity, the principle of the waste hierarchy and the principle of accountability. These are in almost identical form to the principles set out in the EP Act and are discussed in detail in Parts E and F.
180. In addition, the principles include the principle of improved valuation, pricing and incentive mechanisms, the principle of shared responsibility, the principle of product stewardship, the principle of integrated environmental management and the principle of enforcement.
181. Of these, the principle of shared responsibility and the principle of integrated environmental management are immediately applicable to the DGDP.

## **10 Climate Change Act**

### **10.1 Relevant aspects of the CC Act**

182. The CC Act is the legislated framework for climate change action in Victoria.
183. Its purposes, as set out in section 1, include:
- (a) to establish a target to reduce Victoria's greenhouse gas emissions;
  - (b) to facilitate the consideration of climate change issues in specified areas of decision making of the Government of Victoria;

- (c) to promote collaboration, cooperation and innovation in the Victorian response to climate change by strengthening the role of communities and other measures;
- (d) to provide for a strategic response by the Government of Victoria to climate change through a Climate Change Adaptation Plan.

184. This is in the context of the Preamble, which commits the State of Victoria to certain opinions concerning the reality and import of climate change. Key among them, for present purposes, are:

The Parliament of Victoria recognises on behalf of the people of Victoria the overwhelming scientific consensus that human activity is causing climate change.

Climate change is a common concern of humankind and responding to climate change is a responsibility shared by all levels of government, industry, communities and the people of Victoria.

Victoria is particularly vulnerable to the adverse effects of climate change.

Early action is necessary to build Victoria's capacity to respond to the challenges of climate change and enable a more effective response and reduce any economic and social impacts, ensuring Victoria remains a prosperous and sustainable State.

Early action to reduce greenhouse gas emissions will ease the task of long term transition to an environmentally sustainable economy.

185. Section 5 of the CC Act addresses purpose (a) by requiring the Minister to ensure that, by the year 2020, the amount of Victoria's greenhouse gas emissions is 20% below the amount of Victoria's GHG for the year 2000 (**the 20% Reduction Target**).

186. Section 14(2) addresses purpose (b) by requiring a person making a decision of the kind specified in Schedule 1 to have regard to (i) the potential impacts of climate change relevant to the decision; and (ii) the potential contribution to Victoria's greenhouse gas emissions of the decision; and (iii) any guidelines issued by the Minister under section 15 (of which there are none). The grant of a works approval under section 19B of the EP Act is such a decision. As previously noted, the question of whether this applies to the Tribunal on review is resolved by section 51 of the VCAT Act.

187. Purposes (c) and (d) have no direct bearing on the present case, but they do acknowledge the public interest in climate change policy and the need for a strategic response by government to achieving carbon reduction. According to section 6, government's policy objectives are to include "developing a portfolio of energy options

for a low carbon future for Victoria". The parties, of course, have different views on what this means. The fact that new coal technologies have a lower carbon intensity than conventional coal technologies does not necessarily make the former "low carbon". On the other hand, the concept of a "portfolio of energy options" implies multiple choice among options which, together, can achieve carbon sustainability.

188. Although not directly relevant to the Tribunal's decision-making in that they apply only to actions of the Minister, sections 7 to 13 set out guiding principles which the Minister must consider when developing the Climate Change Adaptation Plan and meeting other ministerial obligations under the Act. The principle of Integrated decision-making (s.9), the principle of risk management (including the precautionary principle (section 10(2)) and the principle of equity (section 11) are sufficiently similar to their counterpart principles in the EP Act to reinforce the relevance of those principles to climate change.

## **10.2 Implications of the review of the CC Act**

189. As the Tribunal is aware, a review of the CC Act commenced on 22 October 2011<sup>116</sup> following the introduction of the Commonwealth Clean Energy Bill 2011. This resulted from the requirement in section 19 of the CC Act that "if a Bill is introduced into a House of the Parliament of the Commonwealth for an enactment to provide for a national emissions trading scheme, the Minister must undertake a review of this Act without delay".
190. This is in line with the principle of complementarity (section 11 of the CC Act) which provides that "A decision of the Government of Victoria in response to climate change should complement any actions of the Commonwealth Government relating to climate change including, but not limited to, an emissions trading scheme and any targets or caps on greenhouse emissions fixed by the Commonwealth Government or the Parliament of the Commonwealth".
191. The terms of reference for the review are to examine the CC Act with respect to:
- (a) the impact of a national carbon price on the Victorian Government's climate change policy objectives as outlined in the Act; and
  - (b) appropriate policy mechanisms to achieve the Victorian Government's policy objectives as outlined in the Act<sup>117</sup>.
192. Dr Lynne Williams was appointed to conduct the review on the Minister's behalf.

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<sup>116</sup> Smith MP, Minister announces details of the review of the Climate Change Act, 22 October 2011, exhibit E1

<sup>117</sup> See Review of the Climate Change Act, <http://www.climatechange.vic.gov.au/home/review-of-climate-change-act>

193. The public were invited to make submissions to the review and a total of 357 written submissions were lodged - 64 from various stakeholders and 293 as submissions lodged via EV.
194. Despite the terms of reference for the review being limited to an examination of the policy objectives in section 6 of the CC Act and the policy mechanisms to achieve those objectives, the submissions covered the full ambit of the CC Act. The two issues of contention that are relevant to these proceedings were whether the 20% Reduction Target should be retained and whether the EPA's power to regulate GHG emissions should be curtailed.
195. In general, the submissions supporting the repeal or reduction of the 20% Reduction Target and reducing the power of the EPA to regulate GHG emissions claimed that such measures may not result in any net national reduction in GHG emissions while increasing the overall cost of abatement on the national level. Those supporting retention of the target noted that the *Clean Energy Act 2011* does not cover all sources of emissions (notably, by excluding transport and agriculture) and provides generous handouts to high-carbon emitters which distort the market. A number of submissions argued that there are sound economic and policy reasons why additional direct regulation may be required, that they more immediately encourage low carbon jobs and industries, and that a Victorian specific response to climate change is needed given the special challenges the state faces (e.g. high dependence on emissions intensive electricity generation).
196. The Minister is required to lay a copy of the review before each House of Parliament within 10 sitting days<sup>118</sup> after completion of the review.
197. Given the current status of the review it is unlikely that any changes to the CC Act (if this is an outcome of the review) will occur before the Tribunal makes its decision. Accordingly, the EPA submits that, despite its knowledge that a review is in progress, the Tribunal must apply the CC Act and have regard to its surrounding policy framework (including the Climate Change White Paper) as it currently stands. Not only is this required by law (as the CC Act remains binding law); it is consistent with the Government's media release, in which the Minister for Environment and Climate Change stated:

While the review is underway, it will be business as usual and the provisions of the Climate Change Act will remain operational<sup>119</sup>.

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<sup>118</sup> CC Act, section 19(2)

<sup>119</sup> Smith MP, Minister announces details of the review of the Climate Change Act, 22 October 2011, exhibit E1

### 10.3 Application of section 14

198. As this is the first VCAT decision to be taken under the CC Act, there is little guidance on how the Act, or section 14 in particular, is to be applied. As far as the EPA is aware, there are no precedents for a statutory provision equivalent to section 14 in other States or Territories of Australia.

#### ***Potential impacts of climate change***

199. The first of the requirements in section 14(2) is that a decision maker must have regard to “the potential impacts of climate change relevant to the decision or action”.

200. Sub-section (3) provides that, “in having regard to the potential impacts of climate change, the relevant considerations for a person making a decision or taking an action are potential -

- (a) biophysical impacts;
- (b) long and short term economic, environmental, health and other social impacts;
- (c) beneficial and detrimental impacts;
- (d) direct and indirect impacts;
- (e) cumulative impacts.”

201. The reference in section 14(2)(a) to “the potential impacts of climate change relevant to the decision” is not altogether clear. However, the reference to the impacts *of* (not *on*) climate change suggests that, in the context of decisions on works approval applications, this sub-section is effectively directed to the impacts of climate change on the project (rather than vice-versa). The term “decision” is used generically to refer to the approval or rejection of the project which is the subject matter of the decision.

202. The second reading speech for the CC Act supports this interpretation as it describes this consideration as “the impacts of climate change *on* a particular decision” (our emphasis) <sup>120</sup>.

203. The EPA submits that this means that the Tribunal must consider whether climate change will lead to any biophysical impacts on the relevant project (for example through sea level rise) or any long or short term economic, environmental, health or other social impacts (for example economic impacts due to reduced water availability).

204. Further, the EPA submits that subsections 14(3)(c) – (e) inform the scope of the consideration of the potential impacts identified in (a) and (b). That is, when considering those impacts, the Tribunal must consider beneficial and detrimental impacts, direct and indirect impacts and cumulative impacts.

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<sup>120</sup> Hansard, Legislative Assembly, Fifty-Sixth parliament, First Session, 29 July 2010, at page 2841

### ***Potential contribution to Victoria's GHG emissions***

205. The second of the requirements in section 14(2) is that a decision maker must have regard to “the potential contribution to Victoria's greenhouse gas emissions of the decision or action”. By implication, this effect is assessed by reference to the Victorian target, as this is the only meaningful way to assess the significance of the emissions.
206. Section 14(4) then provides that, “in having regard to the potential contribution to Victoria's greenhouse gas emissions, the relevant considerations for a person making a decision are potential-
- (a) short and long term greenhouse gas emissions;
  - (b) direct and indirect greenhouse gas emissions;
  - (c) increases and decreases in greenhouse gas emissions; and
  - (d) cumulative impacts of greenhouse emissions.”
207. The EPA submits that, in the context of decisions on works approval applications, sub-sections (a) – (d) are referring to emissions of or from the project.
208. In particular, the Tribunal must consider the short and long term GHG emissions (for example GHG emissions during construction as well as over the life of the project) and direct and indirect emissions.
209. When assessing the direct and indirect emissions of a project, the EPA submits that it is appropriate to adopt the scope 1, 2 and 3 emission categories used in the *National Greenhouse Accounts Factors 2011* prepared by the Commonwealth Department of Climate Change and Energy Efficiency.<sup>121</sup> Scope 1 (direct) GHG emissions are from sources within the boundary of the project facility. Scope 2 and 3 (indirect) GHG emissions are generated as a consequence of a project, but are emitted off-site. Scope 2 emissions are the GHG emissions associated with producing the electricity that is used on-site and Scope 3 emissions are other “off-site” GHG emissions, such as the emissions associated with the production of the goods consumed on site.
210. While the reporting scheme under the Commonwealth *National Greenhouse and Energy Reporting Act 2007* does not require Scope 3 emissions to be reported, no such restriction is evident in section 14(4). Further an all-encompassing view of “indirect emissions” is consistent with the decision of the NSW Land and Environment Court in *Gray v The Minister for Planning and Ors* [2006] NSWLEC 720; (2006) 152 LGERA 258 (**Gray**)<sup>122</sup>, which held that the principle of intergenerational equity and the

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<sup>121</sup> Department of Climate Change and Energy Efficiency, *National Greenhouse Accounts Factors*, July 2011, at p6-7, <http://www.climatechange.gov.au/~media/publications/greenhouse-acctg/national-greenhouse-accounts-factors-july-2011.pdf>

<sup>122</sup> *Gray v The Minister for Planning and Ors* [2006] NSWLEC 720 at [126]

precautionary principle require all indirect GHG emissions to be considered for the environmental impacts of a proposal to be adequately assessed.

211. The EPA further submits that the reference to “increases and decreases” in GHG emissions in section 14(4)(c) should be interpreted widely to include changes to the emission levels from a project over time, as well as to increases and decreases in Victoria’s total GHG emissions which may be attributable to the adoption of the project technology, if successful.
212. Section 14(4)(d) refers to *impacts* of GHG emissions (our emphasis), whereas (a) – (c) only require consideration of the level of emissions as such. The EPA submits that this subsection imports a general requirement to consider the contribution that a project may have to climate change, no matter how small that contribution might be or how difficult it might be to quantify.
213. This view is consistent with *Gray*, where Pain J held that “the fact that it is difficult to quantify an impact with precision does not mean it should not be done”<sup>123</sup>. It is also supported by the decision of *Taip v East Gippsland SC (Red Dot) [2010] VCAT 1222* where, in relation to the Council’s decision making in the context of climate change, the Tribunal held that<sup>124</sup>:

Such decision making is difficult. Being difficult is not a sufficient reason to defer it. There are severe and long term consequences from the impacts of climate change that are required to be addressed now.

214. Further in *BT Goldsmith Planning Services Pty Limited v Blacktown City Council [2005] NSWLEC 210*, Pain J held that<sup>125</sup>:

The difficulty with assessing cumulative impact is often that no single event, be it clearing or another threatening process, can be said to have such a significant impact that it will irretrievably or significantly harm a particular habitat or endangered ecological community.

and on this basis concluded:

Arguing that a single site is a tiny percentage of what remains is really an argument which fails to acknowledge cumulative impacts.

215. In *Gray*, Pain J referred to her judgement in *BT Goldsmith*, and said<sup>126</sup>:

As I stated in *BT Goldsmith* (at [90]) failure to consider cumulative impact will not adequately address the environmental impact of a particular development where

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<sup>123</sup> *Gray v The Minister for Planning and Ors* [2006] NSWLEC 720 at [138]

<sup>124</sup> *Taip v East Gippsland SC (Red Dot) [2010] VCAT 1222* at [117]

<sup>125</sup> *BT Goldsmith Planning Services Pty Limited v Blacktown City Council* [2005] NSWLEC 210 at [90]

<sup>126</sup> *Gray v The Minister for Planning and Ors* [2006] NSWLEC 720 at [122]

often no single event can be said to have such a significant impact that it will irretrievably harm a particular environment but cumulatively activities will harm the environment. ... While the provisions [in BT Goldsmith] were different and my conclusions were based in part on the objects of the EP&A Act and the Threatened Species Conservation Act 1995 these findings also apply here.

#### **10.4 Effect of section 14**

216. In the context of the EP Act, section 14 has some significant legal effects. First, it mandates that the scope of the Tribunal's consideration of the third party applications exceeds the limited scope of the grounds the third parties may raise pursuant to section 33B(2). Further, by inherently requiring consideration of risk and (by application of the precautionary principle), the evaluation of "risk-weighted options", it is not constrained by the need for third parties to establish that the use of the proposed works "will" result in unacceptable pollution.
217. Secondly, section 14 effectively dispenses with a line of case law which dismissed the relevance of GHG emissions on the basis that there was no demonstrable causative relationship between the specific proposal and the global phenomenon of climate change<sup>127</sup>. The CC Act indicates unequivocally that the potential impacts of climate change are a relevant consideration when making a works approval decision and, further, that the potential contribution to Victoria's GHG emissions is relevant (in the context of the state's reduction target), whether or not there is a causal link between the project's emissions and global climate change.

#### **10.5 Relevance of the 20% Reduction Target**

218. As set out above, as the State's response to climate change abatement, the target provides the framework for judging the significance of emissions by reference to its impact on the achievability of the target.

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<sup>127</sup> For example, *Wildlife Preservation Society of Queensland Proserpine/Whitsunday Branch Inc v Minister for the Environment & Heritage* (2006) 232 ALR 510

## Part D Policy Framework

### 11 Climate Change Policy

#### 11.1 General

219. At both State and Commonwealth level there is commitment to mitigate the effects of climate change by controlling future greenhouse gas emissions and contributing to global greenhouse reduction. The evolution of these policies was described in the EPA's opening submissions.
220. Since the adjournment of the hearing, there have been further developments in the policy framework at Commonwealth level.
221. Not all aspects of those policies have been legislated and those which have not have a significantly lesser weight than those which have. Indeed, as a matter of administrative law, an unlegislated policy may guide a discretion but cannot dictate the outcome of a discretionary decision.
222. The weight given to an unlegislated policy must also reflect the level of certainty that it will or can be implemented.

#### 11.2 Developments at Commonwealth Level

223. On 13 December 2011, the Commonwealth Government announced that it will no longer proceed with the introduction of an emissions standard or carbon capture and storage (**CCS**) requirements for new coal-fired power stations<sup>128</sup>. These proposed measures were part of the Commonwealth Government's *Cleaner Future for Power Stations* election commitment and were the subject of an Interdepartmental Task Group Discussion Paper that was released in November 2010<sup>129</sup> (**A Cleaner Future for Power Stations**), which was referred to during the hearing.
224. The decision not to proceed with the proposed emissions standard and CCS requirements was also set out in the Commonwealth Government's Draft Energy White Paper "Strengthening the Foundations for Australia's Energy Future" (**Draft Energy White Paper**), released on 13 December 2011 and currently open for public comment<sup>130</sup>. In the Draft Energy White Paper, the Commonwealth Government stated that it considers that an emissions standard is unnecessary in the presence of carbon pricing.

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<sup>128</sup> Minister for Resources and Energy and Tourism, Draft Energy White Paper Released, 13 December 2011, <http://minister.ret.gov.au/MediaCentre/MediaReleases/Pages/DraftEnergyWhitePaperReleased.aspx>

<sup>129</sup> Australian Government, Department of Resources, Energy and Tourism, A Cleaner Future for Power Stations, EPA.050.488

<sup>130</sup> Australian Government, Department of Resources Energy and Tourism, Draft Energy White Paper "Strengthening the Foundations for Australia's Energy Future, at p(xxi), <http://www.ret.gov.au/energy/Documents/ewp/draft-ewp-2011/Draft-EWP.pdf>

225. The Draft Energy White Paper sets out four priority areas for further action, one of which is accelerating clean energy outcomes. It highlights the Government's expectation that Australia's energy mix will diversify, the importance of innovation and the risk of technology "lock-in" if the clean energy transformation is delayed. The Government identified CCS (gas and black or brown coal) as a strategically important technology class (along with large-scale solar and geothermal). However, it recognises the risk that these technologies may fail to emerge and considers that if this occurs "future Australian governments may need to consider other clean energy alternatives to minimise the risk of significantly higher adjustment costs"<sup>131</sup>.

### 11.3 CCS-ready

226. In A Cleaner Future for Power Stations<sup>132</sup>, the Interdepartmental Task Group noted that "CCS-ready" facilitates the transition to CCS and reduces the potential for stranded assets after CCS becomes commercially viable. The Global CCS Institute defines a stranded asset as a plant that shut down before the end of its planned operational lifetime, as it is uneconomic to retrofit CCS.
227. The essential requirements of the globally recognised definition of "CCS-ready" were outlined in the Interdepartmental Task Group Discussion Paper<sup>133</sup>. Essentially the project developer should:
- (a) carry out site specific study in sufficient engineering detail to ensure the plant is technically capable of being fully retrofitted for CO<sub>2</sub> capture, using one or more choices of technology which are proven or whose performance can be reliably estimated as being suitable;
  - (b) demonstrate that retrofitted capture equipment can be connected to the existing equipment effectively and without an excessive outage period and that there will be sufficient space available to construct and safely operate additional capture and compression facilities;
  - (c) identify realistic pipeline or other route(s) to storage of carbon dioxide;
  - (d) identify one or more potential storage areas which have been appropriately assessed and found likely to be suitable for safe geological storage of projected full lifetime volumes and rates of captured CO<sub>2</sub>;
  - (e) identify other known factors, including any additional water requirements that could prevent installation and operation of CO<sub>2</sub> capture, transport and storage, and identify credible ways in which they could be overcome;

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<sup>131</sup> Australian Government, Draft White Paper, at p197-201 and p228

<sup>132</sup> Australian Government, A Cleaner Future For Power Stations, EPA.050.488 at EPA.050.501

<sup>133</sup> Australian Government, A Cleaner Future For Power Stations, EPA.050.488 at EPA.050.501

- (f) estimate the likely costs of retrofitting capture, transport and storage;
  - (g) engage in appropriate public engagement and consideration of health, safety and environmental issues; and
  - (h) review CCS-Ready status and report on it periodically.
228. Further to the Commonwealth Government’s announcement that a CCS-ready standard would be tailored for Australian conditions, the Interdepartmental Task Force proposed that the most relevant principles from the international definition be adopted by Australia. In particular, it proposed, as the “way forward”, a modified set of six principles as follows:
- (a) demonstrate sufficient space and access on site and within the facility to accommodate carbon capture and compression facilities for the majority of the plant’s CO<sub>2</sub> emissions;
  - (b) identify potential areas for long-term geological storage of captured CO<sub>2</sub> (meeting the plant’s capture needs);
  - (c) undertake a site-specific assessment into the technical and economic feasibility of the CO<sub>2</sub> capture retrofit using one or more technology choices;
  - (d) identify a realistic transport method to identified storage sites;
  - (e) demonstrate measures and approvals that deal with the collection and treatment of pollutants resulting from the capture process and provisions for increased water requirements; and
  - (f) estimate the likely costs of retrofitting capture, transport and storage. (Although all of the requirements must be applied, this item is classed as the key requirement)<sup>134</sup>.
229. The Discussion Paper set out under each heading the requirements for supporting plans and analyses.
230. Although the Commonwealth Government has now announced that it will no longer proceed with the introduction of CCS requirements for new coal-fired power stations, the EPA supports the principles outlined by the Intergovernmental Task Group as being appropriate considerations when assessing whether a project is CCS-ready.
231. It is noted that one of the claimed benefits of the IDGCC process is its ability to capture carbon prior to combustion to facilitate CCS when available. Nevertheless, it is important that Dual Gas subject itself to the discipline of CCS-readiness, to ascertain

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<sup>134</sup> Australian Government, A Cleaner Future For Power Stations, EPA.050.488 at EPA.050.503-504

and ensure the practical, economic and logistical feasibility of a CCS retrofit when and if CCS becomes commercially viable.

232. Dual Gas has not challenged the condition in the works approval requiring it to provide for the future installation of carbon capture equipment. Indeed, it volunteered CCS-readiness as part of its application and the Greenhouse Gas Assessment that Dual Gas submitted with its application confirms that the DGDP has been designed to enable the potential retrofit of carbon capture technology when commercially viable<sup>135</sup>.
233. However, the distinction between CCS-readiness and CCS availability is critical. The fact that a facility will be CCS-ready does not dispense with the reality that the plant is likely to operate for some years without CCS and the contingency that CCS may not ever become commercially feasible.
234. Having regard to this distinction, in the EPA's submission it is not appropriate to assess the project on the assumption that CCS will provide the solution to the levels of projected GHG emissions over the life of the project. CCS is a possible, even probable, mitigant, but unless CCS can be guaranteed, the project must be assessed without reference to CCS.

#### 11.4 Closure contracts

235. In July 2011, as part of its Clean Energy Future Package the Commonwealth Government announced the Contract for Closure Program (**CFC Program**). Through the CFC Program, the Government seeks to facilitate the closure of around 2 000 MW of highly emissions intensive generation capacity in Australia by 2020 by entering into Contracts for Closure with eligible and interested generators<sup>136</sup>.
236. On 30 September 2011 the Government invited Expressions of Interest for the program. Five generators have been invited to proceed to the negotiation stage:
- (a) Playford Power Station (Alinta);
  - (b) Energy Brix (HRL);
  - (c) Hazelwood Power Station (Hazelwood Power Partnership, 91.8% owned by International Power GDF Suez Australia);
  - (d) Collinsville Power Station (RATCH); and
  - (e) Yallourn Power Station (TRUenergy).
237. Before the negotiations commence in March 2012, each participating generator is required to provide a detailed closure proposal. Each proposal will be evaluated

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<sup>135</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.534

<sup>136</sup> Australian Government, Department of Resources, Energy and Tourism, Contracts for Closure website, <http://www.ret.gov.au/energy/clean/contract/Pages/ContractforClosure.aspx>

- according to five evaluation criteria: emissions intensity; timing; energy security; value for money; and contractual terms.
238. The Government's preferred closure timeframe is between 1 July 2016 and 30 June 2020, although it has stated that proposals for earlier closures may also be considered.
239. Dual Gas has submitted that the possible closure of existing emissions-intensive coal-fired power stations in the Latrobe Valley under the CFC Program has ramifications for noise, sulfur dioxide (SO<sub>2</sub>) and GHG<sup>137</sup>.
240. As the cumulative impact of the noise, SO<sub>2</sub> and GHG emissions from the DGDP is relevant to the assessment of the Works Approval Application (through the noise design targets, the design criteria in SEPP (AQM) and section 14 of the CC Act respectively), the EPA agrees that it is appropriate for the Tribunal to consider any specific proposal to close significant existing sources of these emissions. However, the weight to be given to any such proposal should be determined according to the certainty that the closures will actually occur within a relevant time period.
241. There is a considerable amount of uncertainty surrounding the CFC Program.
242. First, it is not certain that the Government will actually enter into any Contracts for Closure.
243. In its Administrative Guidelines on the CFC Program, the Government has stated<sup>138</sup>:
- At the end of the CFC Negotiation Stage, and depending on the outcome of negotiations, the Commonwealth may decide to enter into Contracts for Closure with Respondents. If successfully negotiated, the Commonwealth intends to enter into any Contracts for Closure by 30 June 2012. (emphasis added)*
244. Secondly, although the Government has stated that an additional capped funding amount will be available for the CFC Program through the Energy Security Fund<sup>139</sup>, it has not disclosed the amount that will be available.
245. In the "Interim Report – The Carbon Tax: Economic pain for no environmental gain", issued by the Senate Committee on the Scrutiny of New Taxes on 4 October 2011 (**Senate Committee Report**)<sup>140</sup>, the Senate Committee concluded that funds for the CFC Program would come from the contingency reserve and that "the government and Treasury have not accounted for it in the budget as any decisions about those

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<sup>137</sup> Dual Gas, opening submissions, P593 L3-17

<sup>138</sup> Australian Government, Department of Resources Energy and Tourism, Contract for Closure – Program Administrative Guidelines, 30 September 2011, Exhibit D15, at p3 (section 1.5) and again at p6 (section 3.1)

<sup>139</sup> Australian Government, Department of Resources Energy and Tourism, Contract for Closure – Program Administrative Guidelines, 30 September 2011, Exhibit D15, at p1

<sup>140</sup> Australian Senate, Select Committee on the Scrutiny of New Taxes, Interim Report - The Carbon Tax: Economic pain for no environmental gain, October 2011,

[http://www.aph.gov.au/senate/committee/scrutinynewtaxes\\_ctte/carbontax/interim\\_report/report.pdf](http://www.aph.gov.au/senate/committee/scrutinynewtaxes_ctte/carbontax/interim_report/report.pdf)

payments are expected to be made outside the forward estimates, that is, after 30 June 2016”<sup>141</sup>.

246. Therefore, it is not clear how much funding will be allocated, whether it will be enough to secure the closure of the full 2 000 MW (or even a significant portion of it), or what impact the outcome of the next Federal election may have on the CFC Program (due to be held in November 2013).
247. In these circumstances, the EPA submits that no weight should be given to the possibility that existing emissions-intensive coal-fired power stations in the Latrobe Valley may close under the CFC Program.

### **11.5 State Policy Framework - GHG emissions intensity standard**

248. In July 2010 the then Victorian Government announced its intention to restrict the GEI of new power stations to a maximum of 0.8 tCO<sub>2</sub>-e/MWh (**0.8 limit**)<sup>142</sup>.
249. The proposal had bi-partisan support<sup>143</sup> and is still policy, despite the change of government.
250. The Victorian Government has not confirmed whether it is proposing that the 0.8 tCO<sub>2</sub>-e/MWh GEI standard be specified on an “as generated” or “as sent out” basis.
251. The “as generated” GEI is calculated on the basis of the electrical energy generated by the plant. It does not account for the use of auxiliary power consumed by the plant.
252. Alternatively, a power station’s GEI may be expressed on an “as sent out” basis, i.e. based on the electrical energy that the plant sends to the grid (net of the electricity it consumes on-site).
253. The EPA’s submissions on the application of the proposed 0.8 limit to the DGDP are contained in section 14.2.

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<sup>141</sup> Australian Senate, Select Committee on the Scrutiny of New Taxes, Interim Report - The Carbon Tax: Economic pain for no environmental gain, October 2011, at p184 (paragraph 8.43)

<sup>142</sup> Victorian Government, Taking Action for Victoria’s Future: Victorian Climate Change White Paper – Action Plan, July 2010, EPA.050.328 at EPA.050.340

<sup>143</sup> Victorian Liberal Nationals Coalition, The Victorian Liberal Nationals Coalition Plan for Energy and Resources, November 2010, Exhibit E5, EPA.050.1533 at EPA.050.1547 (page 15)

## Part E Project Impacts

### 12 Summary of Project Impacts

254. A summary of the project impacts that have been raised in the applications for review is set out below. A more detailed discussion of each impact and the EPA's response to Dual Gas's and the objector's grounds of review follows this summary.
255. In addition to the impacts that are in dispute, there are a number of other impacts that are relevant to the Tribunal's assessment of the works approval including water discharges; the management, transportation and disposal of solid waste; potential land contamination as a result of DGDP activities; and transportation emissions. These impacts are discussed in section 21 of these submissions.

#### 12.1 Greenhouse Gas Emissions

256. The Tribunal has indicated that it accepts the overwhelming scientific evidence about climate change and recognises the need for urgent action to reduce greenhouse gas emissions<sup>144</sup>.
257. The volume of GHG emissions from the proposed DGDP was a core issue for the EPA when determining the Works Approval Application and is the primary ground of objection to the proposal by environment groups and the public.
258. Dual Gas has estimated the lifetime average annual scope 1 GHG emissions that would be generated by the proposed 600MW DGDP under four notional operating scenarios (Cases 1 – 4)<sup>145</sup>.
259. Under Cases 1 – 3, the project would be operated on different combinations of coal and natural gas. Case 4 is the “non-success” scenario where, after 4 years, the project would be operated solely on natural gas. None of these 4 cases involve the DGDP operating at maximum capacity. Mr Blatchford has confirmed that these operating scenarios adequately represent the future performance of the plant<sup>146</sup>.
260. Dual Gas's estimated GHG emissions range from 762,000 tCO<sub>2</sub>-e/yr (Case 4) to 3,238,000 tCO<sub>2</sub>-e/yr (Case 3)<sup>147</sup>. These figures have not been disputed.
261. These are significant quantities of GHG emissions, particularly for Cases 1 to 3 where the emissions would increase Victoria's GHG emissions profile by approximately 2.5 – 2.6%<sup>148</sup>.

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<sup>144</sup> See comments by DP Dwyer during Mr Shield's opening submissions: Shield, opening submissions, P671 L9-17

<sup>145</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.572-576

<sup>146</sup> Blatchford, examination, P721 L19-21

<sup>147</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.521 (page 6 of appendix D)

<sup>148</sup> Based on 2009 levels of 122 million t CO<sub>2</sub>-e/pa: see Australian Government, Department of Climate Change and Energy Efficiency, State and Territory Greenhouse Gas Inventories 2009, EPA.050.730 at EPA.050.733

## 12.2 Sulfur Dioxide Emissions

262. The DGDP will emit sulfur dioxide (**SO<sub>2</sub>**) to the Latrobe Valley airshed, which is a Class 1 indicator under SEPP (AQM).
263. There was some debate during the hearing regarding the quantity of SO<sub>2</sub> that would be emitted from the proposed 600MW DGDP.
264. Dr Denison calculated that up to 13 million kilograms of SO<sub>2</sub> would be emitted per year (using the emission rates provided by Dual Gas for the purposes of the air modelling and assuming constant operation of the plant). During the hearing, Mr Blatchford provided new evidence that the SO<sub>2</sub> emissions would only be approximately half that figure, on the basis of Dual Gas's proposed operating scenarios and assuming that coal with a lower sulfur content would be used.
265. In either case, the EPA considers that the SO<sub>2</sub> emissions from the proposed DGDP would be significant particularly as the Latrobe Valley airshed appears to be approaching a ceiling for SO<sub>2</sub>.

## 12.3 Oxides of Nitrogen and Particulates

266. The DGDP will also emit oxides of nitrogen (**NO<sub>x</sub>**) and particulates (**PM<sub>10</sub>** and **PM<sub>2.5</sub>**).
267. In its Works Approval Application, Dual Gas stated that the DGDP would emit 0.09 g/m<sup>3</sup> of NO<sub>x</sub> (or 0.1 g/m<sup>3</sup> when the duct burners are operating to achieve peak load)<sup>149</sup>. However, a few days before the commencement of the hearing, Dual Gas advised that it had identified an error in the calculation of the NO<sub>x</sub> emission rates and the rates would in fact be higher than previously advised. During the hearing, Dr Bellair stated that the revised maximum (volume weighted) average concentrations of NO<sub>x</sub> attributable to all sources at the DGDP would be 0.14 g/m<sup>3</sup><sup>150</sup>.
268. Although the NO<sub>x</sub> emissions from the DGDP would exceed the 0.07 g/m<sup>3</sup> emission limit for gaseous fuels in Schedule E of SEPP (AQM), the EPA is satisfied that the NO<sub>x</sub> emissions from the DGDP would comply with the relevant design criteria, would not have an adverse impact on beneficial uses and that Dual Gas is proposing to apply best practice to the management of those emissions. On that basis, the EPA granted Dual Gas an exemption from the requirement to comply with the NO<sub>x</sub> emission limit in Schedule E.
269. Also, the EPA is satisfied that the PM<sub>10</sub> and PM<sub>2.5</sub> emissions from the DGDP would comply with the design criterion for particulates as PM<sub>10</sub> and the design criterion for particulates as PM<sub>2.5</sub> as set out in Schedule A of SEPP (AQM).

<sup>149</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.134-R

<sup>150</sup> Bellair, amended section 3.1.1 of 22 September 2011 Witness Statement, as described in Bellair, examination, P1652 L24-P1653 L17

## 12.4 Noise

270. In the Works Approval Application, Dual Gas provided the sound power levels<sup>151</sup> for various components of the plant which it had obtained from on-site measurements, data supplied by the original equipment manufacturers and data supplied by HRL<sup>152</sup>. Using that information, Mr Nancarrow (on behalf of the EPA) calculated that the 600MW DGDP total unabated sound power level would be 120 dB(A)<sup>153</sup>.
271. In order to assess the acceptability of noise impacts from the DGDP, the project's expected unabated contribution to noise levels at four noise sensitive areas was assessed: 46 McLean St, Morwell; 46 Wallace St, Morwell; 22 McMillan St, Morwell and 30 Church Road, Hazelwood North.
272. On the basis of the sound power levels of the various components of the plant, SKM (on behalf of Dual Gas) modelled the noise levels from the 600MW DGDP at the four selected noise sensitive areas<sup>154</sup>.
273. For 20th percentile weather conditions and with no significant degree of noise mitigation, SKM estimated that the DGDP would produce 42.5 dB(A), 44.5 dB(A) and 46.5 dB(A) at 46 McLean St, 46 Wallace St, and 22 McMillan St, Morwell respectively<sup>155</sup>. These noise levels are significantly higher than the limits for these locations determined in accordance with SEPP N-1 (**the noise limits**), upon which the experts are now agreed. The estimated noise levels at 30 Church Road were very low and consequently the impacts on this location were not considered further.
274. For the 300MW DGDP, noise levels would be three dB(A) lower<sup>156</sup>.
275. Although the noise control measures for the 600MW DGDP as proposed by Dual Gas in the Final Noise Assessment<sup>157</sup> enable it to meet the agreed noise limits at McLean St, Wallace St and McMillan St, they will not enable it to meet the noise design targets which, applying NIRV, the EPA has in each case set 5 dB(A) lower at each site<sup>158</sup>.
276. Even with such measures the 300MW DGDP will still not meet the EPA's noise design targets for two of the three assessment locations.

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<sup>151</sup> A sound power level is a measure of the energy emitted as sound from a source: Nancarrow, expert witness statement, EPA.100.269 at EPA.100.289 (paragraph 124)

<sup>152</sup> SKM, Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.828, (sections 5.2 and 8.1). SKM notes that the available sound power level data for the various components was limited due to the inability of manufacturers to supply noise data information and the highly confidential nature of the gasification process: Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.827 (section 5.1)

<sup>153</sup> Nancarrow, expert witness statement, EPA.100.269 at EPA.100.289, (paragraph 125)

<sup>154</sup> SKM, Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.841 (section 8.1)

<sup>155</sup> SKM, Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.841 (section 8.1)

<sup>156</sup> Broner and Nancarrow, joint expert report (section 4.13)

<sup>157</sup> SKM, Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.844 (table 8-4)

<sup>158</sup> SKM, Environmental Noise Modelling (Final), EPA.020.807 at EPA.020.845 (table 8-5); Broner and Nancarrow, joint expert report (section 4.7); Nancarrow, expert witness statement, EPA.100.269 at EPA.100.283-286, (paragraphs 89, 98, 108)

277. There is ongoing disagreement between the noise experts about whether the EPA's noise design targets are appropriate and feasible. The EPA considers that its noise design targets are in accordance with the NIRV guidelines and SEPP N-1 and that the noise control measures required to achieve those targets are feasible<sup>159</sup>.

## **12.5 Other Air Emissions**

278. Mercury and various class 3 indicators (in particular arsenic, beryllium, cadmium, nickel, silica and lead) will be emitted to air from the DGDP as small quantities of these substances are found in the brown coal which is to be used to fuel the plant.

279. Under SEPP (AQM), Dual Gas must apply best practice to the management of these emissions and, with respect to the class 3 indicators, must reduce these emissions to the maximum extent achievable.

280. The EPA is satisfied that Dual Gas satisfies these requirements of SEPP (AQM).

281. DEA is the only party to these proceedings who has disputed the EPA's assessment of mercury and class 3 emissions. However, DEA did not present any expert evidence at the hearing in support of the claims regarding mercury and class 3 indicators made in its Application for Review, Further and Better Particulars and Outline of Submissions<sup>160</sup>.

282. The only evidence DEA has provided on emissions of mercury and class 3 indicators is a number of reports and studies attached to its Outline of Submissions, which are unsubstantiated and untested.

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<sup>159</sup> This view is supported by the expert witness statement of Mr Nancarrow, see: Nancarrow, EPA.100.269 at EPA.100.286, (paragraph 113)

<sup>160</sup> DEA, opening submissions, P603 L20

## Part F The Principles of Environment Protection

### 13 Case Law on the Principles

#### 13.1 Introduction

283. None of the parties contends that the principles of environment protection do not apply to this case. In fact, each of the parties in its statement of grounds has invoked one or more of the principles.
284. EV/LIVE alleges in its grounds of review that “the use of the works will result in the emission of waste, namely carbon dioxide or equivalent gases, to the environment inconsistent with SEPP (AQM) in that ... the level of emissions produced is inconsistent with the principles of environment protection in clause 7 of the SEPP (AQM), including the precautionary principle”<sup>161</sup>.
285. DEA allege that the EPA has failed to uphold the precautionary principle or the principle of intergenerational equity as they apply to human health.<sup>162</sup>
286. Mr Shield alleges that “given the overwhelming scientific evidence of the enhanced greenhouse effect and its extreme environmental consequences, allowing a large new source of greenhouse gas emissions is clearly inconsistent with the principles (including the precautionary principle and other principles)”. He also refers specifically to the principle of intergenerational equity as being “contradicted by the implied emissions trajectory that would result in dangerous climate change”<sup>163</sup>.
287. Despite its contention that the principles are satisfied by the design criteria in SEPP (AQM), Dual Gas has also separately invoked the principle of integration of economic, social and environmental considerations in support of its case for approval of the project in its originally proposed form.
288. Whilst there is no authority directly on point in Victoria, as a matter of administrative law the principles must be a relevant consideration under the EP Act, regardless of whether they are replicated in SEPP (AQM).
289. The EPA contends that, on the facts, the precautionary principle and other principles including the principle of intergenerational equity, principle of conservation of biological diversity and ecological integrity, principle of the waste hierarchy and the principle of integration of economic, social and environmental considerations apply (although not to the same effect as that for which the other parties contend).

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<sup>161</sup> EV/LIVE, Amended Statement of Grounds, EVL.360.040

<sup>162</sup> DEA, Further Particulars - Statement of Grounds, DEA.460.001 at DEA.460.013

<sup>163</sup> Shield, opening submission, P663 L25

290. The content of each of the principles and an overview of the way they have been interpreted in case law was set out in the EPA's Opening Submissions<sup>164</sup>. Most of the case law is persuasive authority coming out of the NSW Land and Environment Court, some of which has been adopted in Victorian cases (chiefly in relation to the precautionary principle).
291. The EPA's opening submissions are relied upon, with the following expansion. The application of the principles to the matters under review is detailed in Part F.

### 13.2 The precautionary principle

292. In *Environment East Gippsland Inc v VicForests* [2010] VSC 335 (**Brown Mountain**), a forest logging case, Osborn J of the Victorian Supreme Court adopted the analysis of the precautionary principle advanced by Preston CJ in *Telstra Corporation Limited v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256 (**Telstra**).
293. He said:

[188] I respectfully accept the careful analysis of the precautionary principle by Preston CJ in *Telstra Corporation Limited v Hornsby Shire Council* ('the Telstra case'). I accept his Honour's fundamental conclusion:

The application of the precautionary principle and the concomitant need to take precautionary measures is triggered by the satisfaction of two conditions precedent or thresholds: a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage. These conditions or thresholds are cumulative. Once both of these conditions or thresholds are satisfied, a precautionary measure may be taken to avert the anticipated threat of environmental damage, but it should be proportionate.

[189] In the present case EEG alleges threats of serious and irreversible environmental damage by way of impact upon endangered species of fauna. It is a question of fact in each instance as to whether the proposed logging does constitute such a threat.

[190] In the Telstra case, Preston CJ observed relevant factors may include:

- (a) the spatial scale of the threat (for example, local, regional, statewide, national, international);
- (b) the magnitude of possible impacts, on both natural and human systems;

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<sup>164</sup> EPA, opening submissions, at p33-46 (section 13, paragraphs 147-204)

- (c) the perceived value of the threatened environment;
- (d) the temporal scale of possible impacts, in terms of both the timing and the longevity (or persistence) of the impacts;
- (e) the complexity and connectivity of the possible impacts;
- (f) the manageability of possible impacts, having regard to the availability of means and the acceptability of means;
- (g) the level of public concern, and the rationality of and scientific or other evidentiary basis for the public concern; and
- (h) the reversibility of the possible impacts and, if reversible, the time frame for reversing the impacts, and the difficulty and expense of reversing the impacts.

[191] In my view the statement in another context by Mason J in *Wyong Shire Council v Shirt* that a risk though remote may nevertheless be real and not fanciful or far-fetched is apposite here. At 48 his Honour stated that '[a] risk which is not far-fetched or fanciful is real and therefore foreseeable.'

[192] The threat hypothesised must have a scientific basis.

The assessment involves ascertaining whether scientifically reasonable (that is, based on scientifically plausible reasoning) scenarios or models of possible harm that may result have been formulated.

The threat of environmental damage must be adequately sustained by scientific evidence. As was held in *Monsanto Agricoltura Italia v Presidenza del Consiglio dei Ministri*: "... not every claim or scientifically unfounded presumption of potential risk to human health or the environment can justify the adoption of national protective measures. Rather, the risk must be adequately substantiated by scientific evidence."

....

[194] The second condition precedent is that there be 'a lack of full scientific certainty'.

[195] Once again, this is a question of fact and the assessment of it potentially involves complex factors. In the *Telstra* case, Preston CJ postulated that they might include the following:

- (a) the sufficiency of the evidence that there might be serious or irreversible environmental harm caused by the development plan, programme or project;
- (b) the level of uncertainty, including the kind of uncertainty (such as technical, methodological or epistemological uncertainty); and
- (c) the potential to reduce uncertainty having regard to what is possible in principle, economically and within a reasonable time frame.

[196] There is a body of theoretical debate as to what is the requisite degree of uncertainty required to trigger application of the principle.

....

[199] If the conditions precedent are satisfied, the burden of showing the threat of serious or irreversible environmental damage will not occur effectively shifts to VicForests to show that the threat does not exist or is negligible.

If each of the two conditions precedent or thresholds are satisfied — that is, there is a threat of serious or irreversible environmental damage and there is the requisite degree of scientific uncertainty — the precautionary principle will be activated. At this point, there is a shifting of an evidentiary burden of proof. A decision-maker must assume that the threat of serious or irreversible environmental damage is no longer uncertain but is a reality. The burden of showing that this threat does not in fact exist or is negligible effectively reverts to the proponent of the economic or other development plan, programme or project.

The rationale for requiring this shift of the burden of proof is to ensure preventative anticipation; to act before scientific certainty of cause and effect is established. It may be too late, or too difficult and costly, to change a course of action once it is proven to be harmful. The preference is to prevent environmental damage, rather than remediate it. The benefit of the doubt is given to environmental protection when there is scientific uncertainty. To avoid environmental harm, it is better to err on the side of caution.

[200] If the burden is not discharged, VicForests and in turn the Court must assume that there will be serious or irreversible environmental damage.

....

- [203] The precautionary principle is not however directed to the avoidance of all risks.
- [204] The degree of precaution appropriate will depend on the combined effect of the seriousness of the threat and the degree of uncertainty.
- [205] The margin for error in respect of a particular proposal may be controlled by an adaptive management approach.

....

- [207] The precautionary principle requires a proportionate response. Measures should not go beyond what is appropriate and necessary in order to achieve the objective in question. The principle requires the avoidance of serious or irreversible damage to the environment 'wherever practicable'. It also requires the assessment of the risk weighted consequences of optional courses of action.
- [208] A reasonable balance must be struck between the cost burden of the measures and the benefit derived from them.
- [209] The relevant notion of proportionality is however not readily captured by traditional cost benefit analysis.
- [210] The triggering of the precautionary principle does not necessarily preclude the carrying out of a particular land use or development proposal.
- [211] The precautionary principle may also require consideration in the context of other principles of environmentally sustainable development.
- [212] In summary, the application of the precautionary principle to aspects of this case raises the following fundamental issues:
- (a) is there a real threat of serious or irreversible damage to the environment?
  - (b) is it attended by a lack of full scientific certainty (in the sense of material uncertainty)?
  - (c) if yes to (a) and (b), has [the proponent] demonstrated the threat is negligible?
  - (d) is the threat able to be addressed by adaptive management?

(e) is the measure alleged to be required proportionate to the threat in issue?

294. Applying these methodologies and sub-principles, Osborne J determined that the precautionary principle applied to the matter and granted an injunction preventing logging until further flora studies were undertaken and further management plans based on them were developed.
295. The principle requires the decision-maker to display caution as defined by Wheeler J in *Bridgetown/Greenbushes Friends of the Forest Inc v Executive Director of Conservation and Land Management* (1997) 18 WAR 102 and quoted by Osborn J in *Brown Mountain*, where her Honour said<sup>165</sup>:

Adopting for the moment a very broad characterisation of the precautionary approach, a requirement that a decision maker 'be cautious' says something about the way in which the decision must be made. There must be some research, or reference to available research, some consideration of risks, and a more pessimistic rather than optimistic view of the risks should be taken. However, such a requirement does not in any particular case specify precisely how much research must be carried out, or when a risk should be considered to be so negligible that it may safely be disregarded. Still less, does such an approach dictate what courses of action must be taken after the possibilities have been cautiously weighed.

No doubt there are extremes at either end of a spectrum, where one would be able to say that a decision maker had or had not been 'cautious'. Where endangered species are concerned for example, one can see that where readily accessible and unambiguous research material pointed to a serious risk that numbers of the species would be dramatically reduced by a course of action, then the adopting of that course of action, in the absence of any evidence of consideration of alternatives, would seem to point inevitably to a finding that there had been no relevant 'caution'. At the other extreme, an absence of any action, other than research and study, is clearly cautious but is not the only option available in most cases. Although there has been very little judicial consideration of the precautionary approach or 'precautionary principle' (a similar or perhaps identical concept which appears in a number of intergovernmental agreements) the clear thread which emerges from what consideration has been given to the approach is that it does dictate caution, but it does not dictate

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<sup>165</sup> *Environment East Gippsland Inc v VicForests* [2010] VSC 335 at [186], quoting *Bridgetown/Greenbushes Friends of the Forest Inc v Executive Director of Conservation and Land Management* (1997) 18 WAR 102 at 118-119

inaction, and it will not generally dictate one specific course of action to the exclusion of others.

296. The nature of the “caution” required by the principle is also discussed in Peel<sup>166</sup>:

Even in statutes which contain a specific provision regarding precaution, the principle will need to be taken into account or applied in the context of a number of other factors. Implementing the precautionary principle in a development setting will thus always involve its consideration as part of an overall decision-making process that balances a range of matters. In some cases, the necessary balancing exercise may be between the competing demands of environmental protection and the socio-economic benefits of development. In others it may involve a trade-off between different principles of ESD, as in situations where the long-term environmental benefits of a proposal favour a focus on inter-generational equity, but precautionary considerations are also raised because of uncertainties over the nature of some impacts.

297. She goes on to note that the precautionary principle has been invoked by Australian courts to justify a wide range of decisions as “precautionary” measures<sup>167</sup>:

The principle has been used, for example, to call for further scientific research into particular environmental issues, as a basis for imposing monitoring conditions, as a rationale for relying on the recommendations of ‘conservative’ regulatory standards and as a reason for refusing development consent.

298. At paragraph [180] of the *Telstra* case, in a section headed “Precautionary principle does not necessarily prohibit development”, Preston CJ reinforced the point that the principle does not require outright refusal so as to eliminate all risk:

If the precautionary principle were to be interpreted in this way, it would result in a paralysing bias in favour of the status quo and against taking precautions against risk. The precautionary principle so construed would ban “the very steps that it requires”.

299. He went on to say at [181] - consistent with the precautionary principle in clause 3.5.1 of the Australian Government Intergovernmental Agreement on the Environment<sup>168</sup> and principle 15 of the Rio Declaration on Environment and Development – that “the

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<sup>166</sup> Peel, *The Precautionary Principle in Practice – Environmental Decision-Making and Scientific Uncertainty*, The Federation Press, 2005, p192

<sup>167</sup> Peel, *The Precautionary Principle in Practice – Environmental Decision-Making and Scientific Uncertainty*, The Federation Press, 2005, p203

<sup>168</sup> Set out in the Schedule to the *National Environment Protection Council Act 1994* (Cth) at 3.5.1:

Where there are threats of a serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- ii. an assessment of the risk-weighted consequences of various options.

It is also embodied in principle 15 of the Rio Declaration on Environment and Development in similar terms.

solution is to assess the risk-weighted consequences of various options and select the option that affords the appropriate degree of precaution for the set of risks associated with the option”.

300. He also noted [182] that “the precautionary principle is but one of the principles of ecologically sustainable development... It should not be viewed in isolation, but rather as part of the package”.

### 13.3 Principle of inter-generational equity

301. In *Gray, Pain J* drew three principles from an article by Preston J (as he then was) titled “*The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific*”<sup>169</sup>. They are:

- (a) the conservation of options principle which requires each generation to conserve the natural and cultural diversity in order to ensure that development options are available to future generations;
- (b) the conservation of quality principle that each generation must maintain the quality of the earth so that it is passed on in no worse condition than it was received;
- (c) the conservation of access principle which is that each generation should have a reasonable and equitable right of access to the natural and cultural resources of the earth.

302. Whilst the principle of intergenerational equity is generally coupled with the precautionary principle in the context of health risks or climate change risks, there is little other conceptual analysis as to how the principle should be applied.

### 13.4 Principle of Conservation of Biological Diversity and Ecological Integrity

303. In *Bentley v BGP Properties Pty Ltd* [2006] NSWLEC 34 (**Bentley**) – a prosecution under the *National Parks and Wildlife Act 1974* (NSW) for damage to threatened species - Preston J at [58] described the principle of conservation of biological diversity and ecological integrity as “one of the pillars of ecologically sustainable development”. He also noted at [60] that “At a macro level, ecological integrity involves conservation of the ecological processes that keep the planet fit for life”.

304. He went on to discuss the requirements for maintenance of ecological integrity as follows:

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<sup>169</sup> Preston J, *The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific* *Pacific Journal of Environmental Law*, Vol 9, Issues 2 & 3, p109, EPA.050.1326 at EPA.050.1393-1394

61. Maintaining ecological integrity involves maintaining ecosystem health. Ecosystems become unhealthy if their community structure (species richness, species composition or food web architecture) or ecosystem functioning (productivity, nutrient dynamics, decomposition) has been fundamentally upset by human pressures: M Begon, C R Townsend and J L Harper, *Ecology: From Individuals to Ecosystems*, 4th ed, Blackwell Publishing, 2006, p. 645.
62. Maintaining ecological integrity also involves maintaining ecosystem functioning and ecosystem services. Ecosystem functioning is “the sum total of processes such as the cycling of matter, energy, and nutrients operating at the ecosystem level”: R A Virginia and D H Wall, “Ecosystem Function, Principles of” in S A Levin (ed), *Encyclopaedia of Biodiversity*, Academic Press, 2001, Volume 2, p. 345. Ecosystem services are “the wide array of conditions and processes through which ecosystems, and their biological diversity, confer benefits on humanity; these include the production of goods, life support functions, life-fulfilling conditions, and preservation of options”: G Daily and S Dasgupta, “Ecosystem Services, Concept of”, in S A Levin (ed), *Encyclopaedia of Biodiversity*, Academic Press, 2001, Volume 2, p. 353.
305. Osborn J in *Brown Mountain*<sup>170</sup> declined to apply the principle in respect of specific forest coups scheduled for logging, instead granting an injunction on the basis of the precautionary principle until missing data was obtained. As the flip-side of the precautionary principle, he held that the principle should not be applied in the absence of specific data and demonstrated risk.

### **13.5 Principle of Integration of Economic, Social and Environmental Considerations**

306. This principle is easily misunderstood.
307. In *Telstra*<sup>171</sup> Preston CJ described the integration principle as ensuring “mutual respect and reciprocity between economic and environmental considerations”. He went on to say that “the principle recognises the need to ensure not only that environmental considerations are integrated into economic and other development plans, programmes and projects but also that development needs are taken into account in

<sup>170</sup> Environment East Gippsland Inc v VicForests [2010] VSC 335, at [753]-[775]

<sup>171</sup> *Telstra Corporation Ltd v Hornsby Shire Council* [2006] NSWLEC 133 (2006) 146 LGERA 10; (2006) 67 NSWLR 256 at [111]

applying environmental objectives”,<sup>172</sup> citing P Sands, *Principles of International Environmental Law*, 2nd ed, Cambridge University Press, 2003 at p 253.

308. He added that the principle has been refined in recent times to add social development to economic development and environmental protection, quoting the Plan of Implementation of the World Summit on Sustainable Development held in Johannesburg, 2002 on the need to:

promote the integration of the three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars. Poverty eradication, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base of economic and social development are overarching objectives of, and essential requirements for, sustainable development<sup>173</sup>.

309. However, as evidenced by this extract, economic and social development as envisaged by the principle are aspects of the common good. They may be, but are not necessarily, the same as private development for a private economic motive. As such, the principle does not so much require a decision-maker to “balance” – i.e. arbitrate between - competing economic, social and environmental considerations (including “economic viability” from the perspective of the proponent), as to “integrate” them in a model of sustainable progress.

310. In *Lindner & Whetstone v Regional Council of Goyder & Ors (No.2)* [2006] SAERDC 67 Judge Cole and Commissioner Botting of the Environment Resources and Development Court of South Australia, quoting Telstra with approval<sup>174</sup>, denied provisional development plan consent under the *Development Act 1993* (SA) (**Development Act**) to an animal feedlot proposal on the basis that it would expose the Burra River catchment to a significant risk of overuse and consequent harm to its economic, social and environmental assets<sup>175</sup>.

311. The decision was handed down in the context of section 3(c) of the Development Act which required development plans –

- (a) to enhance the proper conservation, use, development and management of land and buildings;
- (b) to facilitate sustainable development and the protection of the environment;

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<sup>172</sup> *Telstra Corporation Ltd v Hornsby Shire Council* [2006] NSWLEC 133 (2006) 146 LGERA 10; (2006) 67 NSWLR 256 at [111]

<sup>173</sup> *Telstra Corporation Ltd v Hornsby Shire Council* [2006] NSWLEC 133 (2006) 146 LGERA 10; (2006) 67 NSWLR 256 at [112]

<sup>174</sup> *Lindner & Whetstone v Regional Council of Goyder & Ors (No.2)* [2006] SAERDC 67 at [31]

<sup>175</sup> *Lindner & Whetstone v Regional Council of Goyder & Ors (No.2)* [2006] SAERDC 67 at [36]

- (c) to encourage the management of the natural and constructed environment in an ecologically sustainable manner; and
  - (d) to advance the social and economic interests and goals of the community.
312. Given the express direction to advance “the social and economic interests of the community” (as distinct from the proponent), the Court had no difficulty in integrating economic, social and environmental considerations as required by the principle<sup>176</sup>.
313. Looking closely at the wording of section 1B of the EP Act, it is once again the public interest in economic, social and environmental outcomes that is paramount:
- (a) Sound environmental practices and procedures should be adopted as a basis for ecologically sustainable development for the benefit of all human beings and the environment.
  - (b) This requires the effective integration of economic, social and environmental considerations in decision making processes with the need to improve community well-being and the benefit of future generations.
  - (c) The measures adopted should be cost-effective and in proportion to the significance of the environmental problems being addressed.
314. The first limb is entirely concerned with “sound environmental practices and procedures” which have as their object the achievement of ecologically sustainable development in the public interest (i.e. “for the benefit of all human beings and the environment”).
315. The second limb is subsumed in the first in that it is the means to arrive at the “sound environmental practices and procedures”. Importantly, it does not require economic, social and environmental considerations to be “integrated” as between themselves so much as to be integrated, as a group, with “the need to improve community well-being and the benefit of future generations”. As such, it too is directed to the public interest in sound environmental practices and procedures.
316. It is only in the third limb that the issues of “cost effectiveness” and “proportionality” arise and again their subject is the sound environmental practices and procedures. In this context, it is the impost on society – rather than an individual proponent – that is of primary interest.
317. This interpretation is a far cry from the use which Dual Gas seeks to make of the principle in its grounds of review. In summary –

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<sup>176</sup> *Lindner & Whetstone v Regional Council of Goyder & Ors (No.2)* [2006] SAERDC 67 at [38]

- (a) Grounds 5(b)(iii) and (iv) challenge the reduction in the plant and electrical capacity in the Works Approval from 600MW to 300MW on the basis that the reduction does not advance the principles of environment protection in the EP Act and is inconsistent with the principle of integration of economic, social and environmental considerations.
  - (b) Ground 6(c) challenges the noise mitigation measures on the basis that they do not advance the principle of integration.
  - (c) Ground 7(g) challenges condition 3.1(a) relating to SO<sub>2</sub> reduction on the basis that it does not advance the principle of integration.
318. Although grounds 5(b)(i) and (ii) do not refer in terms to the principle of integration, they do so implicitly by raising the economic viability of the approved facility and the impact on the per unit cost of electricity production. It is submitted that such matters are only possibly relevant to this review to the extent that they fall within the economic element of the principle of integration.
319. In support of Dual Gas’s approach to the principle, Counsel for Dual Gas has referred the Tribunal to *Phosphate Co-operative Company of Australia Ltd v Environment Protection Authority* (1977) 138 CLR 134; [1977] HCA 65 (**PCC**) where the High Court was called upon to decide “whether the Environment Protection Appeal Board can or ought to take into account as a matter of the true construction of the [EP Act], the economic consequences to the community of the imposition of the condition, the utility to the public of the operations affected by the licence or the economic cost to the holder of the licence of the imposition of the condition.”<sup>177</sup> The Court held, by majority, that the task of a decision-maker under the Act was “not to minimize pollution to the extent consistent with maintenance of the existing or some other particular level of industrial and commercial activity ... [but], rather, to control the discharge, emission and depositing of wastes into the environment to the extent necessary to prevent the occurrence of what the Act defines as pollution”<sup>178</sup>.
320. Counsel for Dual Gas does not say, but perhaps implies, that the principle of integration of economic, social and environmental considerations was introduced into the Act to address this perceived deficiency. He claims that the principle “unambiguously re-calibrated the decision-making criteria”<sup>179</sup>.
321. It is submitted that this “re-calibration” (if that is what it is) is over-stated in that it seems to imply that economic and social considerations have been liberated to compete with

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<sup>177</sup> *Phosphate Co-operative Company of Australia Ltd v Environment Protection Authority* (1977) 138 CLR 134; [1977] HCA 65 at 136

<sup>178</sup> *Phosphate Co-operative Company of Australia Ltd v Environment Protection Authority* (1977) 138 CLR 134; [1977] HCA 65 at 137

<sup>179</sup> Dual Gas, opening submissions, P584 L21-23

environmental outcomes. The principle in section 1B remains directed to “sound *environmental practices and procedures*” which serve *community well-being and the interests of future generations* (our emphasis) and it is the cost effectiveness and proportionality *of the measures to the significance of the environmental problems being addressed* that is at issue, not their effect on the economic viability of the enterprise or on the economy more generally.

322. In the absence of any Victorian or interstate case law applying the principle in more than passing fashion, some guidance may be drawn from the Commonwealth AAT and Federal Court’s interpretation of similar provisions in the *Fisheries Management Act 1991* (Cth) (**FM Act**) prior to the amendments which were made to that Act in 2006.
323. This is particularly useful in the context of climate change risks given that the management of fisheries and the atmosphere face similar challenges - they are both open access resources that are potentially subject to overexploitation due to the “tragedy of the commons”<sup>180</sup> and subject to high levels of scientific uncertainty.
324. Section 3(1) of the FM Act at that time required the Australian Fisheries Management Authority (**AFMA**), in performing its functions, to pursue the following objectives (among others):
- (a) To implement *efficient and cost-effective* fisheries management on behalf of the Commonwealth;
  - (b) To ensure that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle, in particular the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and
  - (c) To *maximise economic efficiency* in the exploitation of fisheries resources.
325. There are a number of cases on these provisions which consider such issues as:
- (a) how to reconcile the principles;
  - (b) how to assess “cost effectiveness” and “economic efficiency” in the context of scientific uncertainty affecting the principles of ecologically sustainable development; and

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<sup>180</sup> An accurate and succinct definition of ‘tragedy of the commons’ is provided in Wikipedia – “The tragedy of the commons is a dilemma arising from the situation in which multiple individuals, acting independently and rationally consulting their own self-interest, will ultimately deplete a shared limited resource, even when it is clear that it is not in anyone’s long-term interest for this to happen.”

(c) the difference between “economic efficiency” as a public, as against private, objective.

326. In *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 the AAT upheld a challenged condition on a fishing licence prohibiting fishing north of a certain parallel until fish stocks were properly determined. In considering whether the restriction was consistent with AMFA’s objectives under section 3(1), the AAT accepted that the restriction would cause short term inefficiencies in the fishing industry<sup>181</sup> and would cause some long term retarding of the growth of investment in the fishing industry<sup>182</sup>. But it accepted that, in an environment of uncertainty about fish stocks, there was a risk of over-capitalisation which needed to be addressed. It held that:

... the Board's decision recognised that the ESD objective was best served by any measure that could retard the rate of capital growth in the fishery. It decided to retain the inefficiencies the line produced in the fishery in the longer-term interest of retarding, to the extent the line might, the rate of investment in the fishery<sup>183</sup>.

327. In relation to the applicant’s argument that the policy was implemented without sufficient data, the AAT noted that<sup>184</sup>:

The lack of data means that no one can really predict when, and if, overcapitalisation will occur in the presence of the line pending the implementation of the management plan. In the short-term the line is retained as a precautionary measure.

328. In *Re Ajka Pty Limited and Australian Fisheries Management Authority* (2001) 63 ALD 261; [2001] AATA 258 AFMA’s “limited access policy” severely restricting the fishing of skipjack tuna in 3 fisheries was alleged to be inconsistent with the requirements in section 3(1) to implement efficient and cost-effective fisheries management and maximise economic efficiency in the exploitation of fisheries resources. In finding for AFMA, the AAT noted that while the precise environmental benefits of the policy could not be determined in the absence of further data it was “a step towards achieving” the objective in section 3(1)(b)<sup>185</sup>.

329. In relation to the objectives in section 3(1)(a) and (c) the AAT stated at [87]:

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<sup>181</sup> *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 at [178]

<sup>182</sup> *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 at [202]

<sup>183</sup> *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 at [181]

<sup>184</sup> *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 at [194]

<sup>185</sup> *Re Ajka Pty Limited and Australian Fisheries Management Authority* (2001) 63 ALD 261; [2001] AATA 258 at [86]

Where the relevant circumstances of a particular fishery are well known, then it may be that each and every objective must be pursued. Here we have, however, developing fisheries where the relevant knowledge is not in place. The pursuit of the s.3(1)(b) and the corresponding s.6(b) objectives in relation to the refusal to issue the relevant permits is, in the opinion of the Tribunal, paramount and transcends the pursuit of the other objectives. Whatever relevance the refusal to grant the permits sought by the applicant may have to the pursuit of the other objectives, the s.3(1)(b) and s.6(b) objectives must, of necessity, outweigh the others, or any of them.

330. In *Australian Fisheries Management Authority v Graham* (2003) 127 FCR 463 (**Graham**), Justice Ryan at [36]-[37] accepted the view of “maximising economic efficiency” adopted by Branson J in *P W Adams Pty Ltd v Australian Fisheries Management Authority* (1998) 49 ALD 68 where, at pages 76-77, Justice Branson said:

Plainly, there is a difference between “maximising economic efficiency in the exploitation of fisheries resources” and maximising the economic efficiency of individual participants in the fishing industry. The objectives of AFMA are objectives intended to be pursued in the public interest; they are not intended to require AFMA to pursue, assuming that it would be possible for it to do so, the separate interests of individual participants in the fishing industry. Of course, in many circumstances, the respective interests of individual participants in the fishing industry and the public interests which AFMA is required by its objectives to pursue in the performance of its functions will be consistent. In some circumstances they will not be consistent.

331. In *Re De Brett Investments Pty Ltd and Anor and Australian Fisheries Management Authority and Anor* (2004) 82 ALD 163; [2004] AATA 704 concerning AFMA’s decision to impose a condition on all current fishing licences banning the removal of shark fins at sea, the AAT was not satisfied on a wide view that there was an adverse effect on the economic efficiency of the fishery, despite evidence that there was an increased cost to individual operators.

332. The AAT also commented (at [179]) that:

..... [the relevant fishery], for example, cannot be managed with maximum economic efficiency in the exploitation of its resources and be exploited in a manner that is consistent with the principles of ecologically sustainable development if AFMA does not have knowledge of the shark stock and the impact of fishing activities and other factors on that stock.

333. All of these cases clearly favour the public benefit, notwithstanding that there may be adverse economic consequences for an operator or even for the industry. They also strongly suggest that “cost-effectiveness” and “proportionality” are subject to the precautionary principle and that the latter must prevail even over clear evidence of economic detriment because it is simply not possible to determine proportionality and cost effectiveness in the context of scientific uncertainty about environmental effects (and hence about the public interest in ecologically sustainable development).
334. (For completeness, it is conceded that a number of the cases discussed above also involved an analysis of the threshold for the application of the precautionary principle, with the AAT generally finding that the precautionary principle is only triggered where there is sufficient scientific evidence to support a conclusion that there are “threats of serious or irreversible harm”. This is contrary to more recent case law on the precautionary principle and reflects some drafting peculiarities in the FM Act at that time. In any event, there is scientific evidence to meet this threshold in this case. Further, despite the AAT finding in a number of cases that the precautionary principle had not been triggered, it still applied precautionary measures as a “step towards” achieving the objective in section 3(1)(b)<sup>186</sup> or by relying generically on the application of the principles of ecologically sustainable development (which, at the time, were not defined in the FM Act)<sup>187</sup>).
335. Finally, like each of the other principles the principle of integration is moderated by the other principles. It is one of the principles, not the arbitrator of them. As such, any outcome of the exercise of the integration principle must be balanced against the precautionary principle, the principle of intergeneration equity, the principle of conservation of biological diversity and ecological integrity and others.

## 13.6 Other principles

336. On the basis that the remaining principles either do not apply or apply only peripherally, case law investigation has been limited to the above.

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<sup>186</sup> *Re Ajka Pty Limited and Australian Fisheries Management Authority* (2001) 63 ALD 261; [2001] AATA 258 at [86]

<sup>187</sup> *Dixon and Australian Fisheries Management Authority and Executive Director of Fisheries WA and Northern Territory of Australia* [2000] AATA 442 at [171] and [179]

## Part G Detailed Impact Assessment

### 14 Assessment of Greenhouse Impacts

#### 14.1 Climate Change Act

##### ***Short and long term GHG emissions from the DGDP***

337. In the Works Approval Application, Dual Gas provided its calculations of the GHG emissions from the 600MW DGDP over the life of the project for each of its 4 operating scenarios<sup>188</sup>.

338. According to these figures, the first years' emissions will be relatively low (300 – 377 ktCO<sub>2</sub>-e), and will ramp up over the first few years to sit at around 3,000 ktCO<sub>2</sub>-e/year for Cases 1 – 3 for the remainder of the 30 year project term. Under Case 4, from 2013/14 emissions stabilise at around 1,000 ktCO<sub>2</sub>-e/year until 2027, when they fall to around 550 ktCO<sub>2</sub>-e/year for the remainder of the project term.

339. These are significant quantities of GHG emissions.

340. The EPA had regard to these predicted levels of GHG emissions when determining the Works Approval Application.

341. Dual Gas may argue that it expects that CCS will be implemented during the life of the project and therefore it is likely that its long term emissions would be substantially lower than these estimates. In particular, the Works Approval Application claims that the future retro-fitting of CCS to the DGDP would reduce the expected GEI to 0.26 tCO<sub>2</sub>-e / MWh<sup>189</sup>.

342. However, as stated above, the EPA submits that it is not appropriate to assess the DGDP on the assumption that CCS will provide the solution to the project's GHG emissions given that it is not certain that CCS will ever become commercially viable.

##### ***Direct and indirect GHG emissions from the DGDP***

343. Dual Gas provided information on Scope 1, 2 and 3 GHG emissions in its Works Approval Application<sup>190</sup>.

344. The scope 1 (direct) GHG emissions from the DGDP are clearly the most significant and the relevant figures are set out above.

345. As Dual Gas will make very minimal electricity purchases, it did not provide any figures for its Scope 2 GHG emissions.

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<sup>188</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.573-576

<sup>189</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.560

<sup>190</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.545

346. Scope 3 GHG emissions from the DGDP are from the extraction, production and transportation of brown coal and natural gas and from materials used in construction of the plant (particularly steel and concrete). Dual Gas calculated that these emissions would add approximately 0.01 to the GEI of the DGDP and be between 1.6 and 2.0% of total GHG emissions from the plant (based the operating scenarios under Cases 1 – 3).<sup>191</sup>
347. The EPA did not assess these Scope 3 emissions further as it considers that they are relatively insignificant.

### ***Increases and decreases in Victoria's total GHG emissions***

348. It is clear that, viewing the DGDP in isolation, it would increase Victoria's total GHG emissions. The EPA has calculated that this would be by approximately 2.5 – 2.6% (for Cases 1- 3)<sup>192</sup>.
349. In its outline of opening submissions, Dual Gas referred to the following statement in its Works Approval Application<sup>193</sup>:

If new IDGCC technology with a GGI of 0.73 tCO<sub>2</sub>-e/MWh was to displace the current fleet of brown coal power stations, this would result in annual savings of approximately 24 Mt of CO<sub>2</sub>-e emissions per annum (a 42% reduction in these emissions in the Latrobe Valley). HRL estimates that a further savings of approximately 21 Mt per annum would be achieved with the development and implementation of carbon capture and storage technologies. The total annual savings of 45 Mt CO<sub>2</sub>-e would equate to 8.3% of the total Australian CO<sub>2</sub> emissions (based on 2007 data).

350. Although this would be an attractive outcome, the EPA considers that this claim is without foundation. In Dr Washusen's opinion, "the new power station providing a base load capacity in Victoria would be extremely unlikely to displace the existing brown coal capacity, even with a carbon price of \$23 a tonne"<sup>194</sup>. Further, even if power stations in the Latrobe Valley were to close under the CFC program (assuming that it proceeds), Dr Washusen agreed with AEMO's conclusion that retired coal-fired power stations would be replaced by wind or combined cycle gas turbines<sup>195</sup>. Finally, given the uncertainty around the commercial viability of CCS, trying to account for the effect CCS technology may have on a hypothetical fleet of IDGCC-based plants is even more speculative.

<sup>191</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.558

<sup>192</sup> Based on 2009 emission levels of 122 million tCO<sub>2</sub>-e/yr: see Australian Government, Department of Climate Change and Energy Efficiency, State and Territory Greenhouse Gas Inventories 2009, EPA.050.730 at EPA.050.733

<sup>193</sup> Dual Gas, outline of submissions, DGA.250.001 at DGA.250.025 (paragraph 81); Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.565

<sup>194</sup> Washusen, examination, P1342 L9-12

<sup>195</sup> Washusen, cross-examination, P1446 L4-9 and P1447 L31-P1448 L4

351. However, although not strictly applicable under section 14(2)(b), the EPA accepts that there is a potential for the IDG technology (if successfully demonstrated) to have, as Counsel for Dual Gas says, “global relevance” as it could be adopted in developing countries which have significant reserves of low rank coal (such as China) displacing existing and proposed lower efficiency generation technologies<sup>196</sup>. Therefore, the EPA agrees that successful demonstration of the IDG technology may (but is by no means certain to) have the *potential* to contribute to a reduction in global GHG emissions in the long term.

### ***Cumulative impacts of DGDP’s GHG emissions***

352. Although the GHG emissions from the DGDP may only be a small contributor to global GHG emissions, the EPA accepts Professor Karoly’s evidence that “all anthropogenic emissions of greenhouse gas emissions into the atmosphere bear a partial responsibility for future climate change”<sup>197</sup>. Further, the EPA accepts Professor Karoly’s evidence on the likely impacts of climate change<sup>198</sup>.

353. The EPA was mindful of the cumulative impact of the GHG emissions from the DGDP on climate change when determining the Works Approval Application.

### ***The 20% Reduction Target***

354. On one view, if the Minister has a statutory obligation to meet the target, the target will be met regardless of any decision by the decision-maker. Applying that logic, the decision-maker need never refuse a proposal, even one with high emissions. However, Parliament has seen fit to require, in parallel, that the Minister must take executive action to set and meet the target and that decision-makers must take into account the effects their decision may have on the Minister’s capacity to meet the target.

355. Dr Washusen gave expert evidence that, even if the DGDP demonstration is successful, there is little prospect of the technology being adopted in Victoria in substitution for more emissions intensive existing plant<sup>199</sup>. As such, it is unlikely to contribute to the realisation of the 2020 target. Further, by increasing Victoria’s GHG emissions in the order of 2.5%, it will make achieving the target within the 2020 timeframe materially more difficult.

356. The EPA notes the Tribunal’s comment that<sup>200</sup>:

Mr Molesworth’s observation in the Opening Submissions was, well, 300MW makes it easier to get to the target than 600. Well, I’m not sure that’s enough of

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<sup>196</sup> Dual Gas, opening submissions, P528 L23-29 and P548 L10-15; Tsesmelis, cross-examination, P968 L22-27

<sup>197</sup> Karoly, expert witness statement, EVL.300.655 at EVL.300.658 (paragraph 16)

<sup>198</sup> Karoly, expert witness statement, EVL.300.655 at EVL.300.656-658 (paragraphs 7-15)

<sup>199</sup> Washusen, examination, P1342 L9-12

<sup>200</sup> DP Dwyer, general discussion, P1758, L17-23

an answer, because if you refuse the project completely, that's better than 300. But I don't think that's necessarily the way in which you go about the consideration. It's a lot more sophisticated than that ...

357. It should be noted that 300MW was not arrived at in order to halve the level of GHG emissions, but rather through a "calculus" based on best practice, the principles *and* the CC Act considerations.

## **14.2 Victoria's proposed GEI standard for new power stations**

358. Dual Gas has estimated the lifetime project average GEI for the 600MW DGDP under its four operating scenarios. Its estimates range from 0.45 tCO<sub>2</sub>-e/MWh (Case 4) to 0.78 tCO<sub>2</sub>-e/MWh (Case 3), calculated on an "as generated" basis<sup>201</sup>.
359. When calculated on an "as sent out" basis, the lifetime project average GEI for the 600MW DGDP ranges from 0.46 tCO<sub>2</sub>-e/MWh (Case 4) to 0.84 tCO<sub>2</sub>-e/MWh (Case 3)<sup>202</sup>. This takes Cases 2 and 3 over the Victorian Government policy threshold if the threshold is based on electricity "as sent out"<sup>203</sup>.
360. In its statement to the Tribunal<sup>204</sup>, the Government indicated that there are a number of policy issues yet to be considered in formalising the target.
361. If the target is to be introduced, the following questions must be clarified:
- (a) whether it is to be calculated on an "as generated" or a "sent out" basis; and
  - (b) the compliance period or reporting period for which calculations are to be conducted (eg. annual, quarterly, monthly, continuous).
362. Without that clarity, it is impossible to assess whether the GEI of the DGDP, in Cases 1 - 3, complies with the policy target. However, in the course of the assessment of the Works Approval Application, Dual Gas committed to operating the plant to meet a GEI target of 0.8 on whichever basis was formally adopted or legislated by Government.
363. In this context the EPA imposed condition 2.1 on the Works Approval which provides that<sup>205</sup>:
- The plant must be designed in a manner which enables it to comply with an operational Greenhouse Gas Emissions Intensity requirement of 0.8 tCO<sub>2</sub>-e/MWh to the satisfaction of the EPA.
364. The Tribunal has requested further explanation of why the EPA imposed condition 2.1 on the Works Approval and what is meant by it<sup>206</sup>.

<sup>201</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.521 (page 6 of appendix D)

<sup>202</sup> Blatchford, examination, P741 L12-14

<sup>203</sup> Blatchford, examination, P741 L11-17

<sup>204</sup> Gibbons, statement provided to VCAT, 10 November 2011, exhibit E3

<sup>205</sup> EPA, Works Approval WA67043, EPA.020.285 at EPA.020.288 (page 4)

365. In the context of the matters which the EPA must consider under section 14 of the CC Act, a reliable operational benchmark is the only basis from which the plant's contribution to Victoria's greenhouse gas emissions can be quantified and assessed. As the EPA's determination of the (partial) acceptability of the proposal was based on a maximum GEI of 0.8 tCO<sub>2</sub>-e/MWh, it was considered important to ensure that, operationally, the quantification was accurate.
366. For the purposes of setting that benchmark, it was logical and reasonable to adopt the target which both the former and current Governments had announced as the standard to be adopted (albeit subject to consultation).
367. The condition was also considered important in view of the requirement in section 20(7) of the EP Act that conditions on a licence must not be inconsistent with any conditions specified in the relevant works approval.
- 367A With respect to the "as sent out" vs "as generated" issue the EPA accepts that, given that the condition anticipates a licence condition, imposition of the higher (ie. "as sent out") standard would preserve the EPA's ability to require 0.8 tCO<sub>2</sub>-e/MWh "as sent out" – without falling foul of section 20(7) of the EP Act - if that is the basis on which the standard is ultimately specified. Whilst the condition applies to the works in that it requires the plant to be designed so that it can operate to either standards, for all practical purposes it will only take effect when a licence is issued and the plant becomes operational, by which time the policy issue is likely to have been resolved.

### ***Dual Gas's position***

368. On the estimates provided by Dual Gas itself, a GEI of 0.8 tCO<sub>2</sub>-e/MWh is reasonably achievable on either basis. However, during the hearing, it argued that, pending/dependent on legislative enactment of the standard, the 0.8 tCO<sub>2</sub>-e/MWh standard in condition 2.1 should be interpreted as being on an "as generated" basis.
369. Dual Gas has referred to the following documents in support of this interpretation:
- (a) an article in The Age quoting then Labor government spokesman Roxanne Punton regarding the Victorian 0.8 GEI standard<sup>207</sup>;
  - (b) the CPRS Green Paper dated July 2008<sup>208</sup>;
  - (c) the CPRS White Paper dated December 2008<sup>209</sup>;

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<sup>206</sup> Walton, examination, P1299 L24-P1300 L2

<sup>207</sup> Proposed Coal Plant Under Fire by Adam Morton, The Age, 5 August 2010, exhibit D3; Dual Gas, general discussion, P858 L11

<sup>208</sup> Extracts from Australian Government, The Carbon Pollution Reduction Scheme – Green Paper, July 2008, exhibit O7

<sup>209</sup> Extracts from Australian Government, The Carbon Pollution Reduction Scheme – White Paper, Volume 2, December 2008, exhibit O7

- (d) the revised explanatory memorandum for the CPRS Bill 2009<sup>210</sup>;
  - (e) a press release from the Commonwealth Department of Resources, Energy and Tourism entitled “Clean Energy Package – Transforming Australia’s Electricity Generation Sector” dated July 2011<sup>211</sup>;
  - (f) a letter to the Department of Resources, Energy and Tourism from EPA Victoria dated 21 February 2011<sup>212</sup>;
  - (g) the Commonwealth Government Interdepartmental Task Force Discussion Paper “A Cleaner Future for Power Stations”<sup>213</sup>; and
  - (h) two press releases from the Labor Party which refer to the proposed new plant standards for power stations<sup>214</sup>.
370. If this interpretation is adopted, Dual Gas would not be required to use as much natural gas in the plant to “dilute” the GHG emissions from burning the syngas as it would if the target were specified on an “as sent out” basis.
371. Mr McIntosh calculated that to meet a GEI requirement of 0.8 tCO<sub>2</sub>-e/MWh on an “as sent out” basis the natural gas input would have to be increased from 21% (which is required to achieve the target on an “as generated” basis) to 32%<sup>215</sup>.
372. Mr Walton claimed that using more natural gas to comply with a 0.8 tCO<sub>2</sub>-e/MWh standard on an “as sent out” basis would reduce the DGDP’s competitive edge (in short run marginal cost terms) and will make a difference to the ultimate competitive position of the project<sup>216</sup>.
373. This claim has little merit, given that an “as sent out” standard will either apply to all new entrants to the market by the time the DGDP is operating or, if the standard is “as generated”, the EPA would adopt that in the equivalent licence condition.

### ***EV/LIVE’s position***

374. EV/LIVE has argued that the target should be interpreted as being on an “as sent out” basis and referred to the following documents in support of that interpretation:
- (a) the 2006 Generator Efficiency Standards<sup>217</sup>

<sup>210</sup> Extracts from Carbon Pollution Reduction Scheme Bill 2009 – Revised Explanatory Memorandum, Parliament of Australia – Senate, exhibit O7

<sup>211</sup> Australian Government, Department of Resources, Energy and Tourism, Clean Energy Package – Transforming Australia’s Electricity Generation Sector, July 2011, exhibit O7

<sup>212</sup> EPA, Letter from John Merritt, CEO of EPA Victoria to Cleaner Future Power Station IT Secretariat, Commonwealth Department of Resources, Energy and Tourism, 21 February 2011, exhibit O7

<sup>213</sup> Australian Government, A Cleaner Future For Power Stations, EPA.050.488

<sup>214</sup> A Cleaner Future for Power Stations, Australian Labor Party, Exhibit D1; Tough emissions standards for new coal-fired power stations, Australian Labor Party, 23 July 2011, exhibit O3

<sup>215</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.400-R (paragraph 58)

<sup>216</sup> Walton, cross-examination, P1377 L1-5 and L16-20

<sup>217</sup> Australian Greenhouse Office, Department of the Environment and Heritage, Technical Guidelines – Generator Efficiency Standards, December 2006, exhibit O13; Blatchford, cross-examination, P837 L29

- (b) an extract from the 2009 Australian Greenhouse Accounts National Inventory Report<sup>218</sup>.

***The EPA's submissions on condition 2.1***

375. The requirement that all new power stations in Victoria not exceed a GEI of 0.8 tCO<sub>2</sub>-e/MWh (**0.8 limit**) is not yet a legal requirement.
376. Therefore, it is not possible to argue that the Tribunal must impose the 0.8 limit or that the case to do so is overwhelming.
377. However, by analogy with planning, the 0.8 limit has weight as a “seriously entertained proposal” published in the Climate Change White Paper<sup>219</sup> and can be interpreted as a signal that there is a reason to regulate the GEI of power stations using emissions intense fuel sources. As the first relevant development since the announcement of the intended limit, the DGDP is an important opportunity for the Tribunal to impose a condition consistent with it (which it has power to do, regardless of the fact that the 0.8 limit is not in force as law).
378. The immediate implication of not imposing a design condition which foreshadows a consonant licence limit is that the DGDP may be able to resist the licence condition, which it may be incentivised to do if there are financial benefits in operating at a GEI unmitigated by dilution with natural gas to meet the 0.8 limit.
379. The EPA submits that, if the Tribunal does not take the present opportunity to set a benchmark (and indeed is seen to resile from one) it will be very difficult to do so in the future unless a limit is legislated. Given the declared feasibility of meeting the 0.8 limit, the “best practice” requirement in SEPP (AQM) and the Tribunal’s obligation under the CC Act to take independent account of climate change, there is every reason for the Tribunal to support the condition regardless of its views of the probability of it being legislated.
380. In this context, the Tribunal may be interested in the conclusions of the UK House of Commons Energy and Climate Change Committee report on Emissions Performance Standards, which recommended the adoption of GEI regulation in tandem with the EU emissions trading scheme (**EU ETS**) of which the UK is part. Although the recommendations are currently on hold, the Committee advanced the following

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<sup>218</sup> Australian Greenhouse Accounts National Inventory Report for 2009, page 50, exhibit O6

<sup>219</sup> Victorian Government, Taking Action for Victoria’s Future: Victorian Climate Change White Paper – Action Plan, July 2010, EPA.050.328 at EPA.050.340; Victorian Government, Taking Action for Victoria’s Future: Climate Change White Paper – The Implementation Plan, October 2010, EPA.050.361 at EPA.050.381

arguments in support of the need for regulation separate from the EU ETS<sup>220</sup>. Whilst some are UK specific, most have general application:

- (a) The carbon price generated by the EU ETS has been too low and too volatile to produce strong enough pricing signals to encourage sufficient investment in low-carbon technology for the UK to reach its greenhouse gas abatement goals, and is unlikely to produce such a signal in the short term<sup>221</sup>.
- (b) Without the market arrangements to guide investment now, decisions may be made that “lock in” high carbon infrastructure. This would make it more difficult and expensive to reach emissions targets in the future<sup>222</sup>.
- (c) GEI standards provide a certain and predictable way to prevent “lock-in” of high carbon infrastructure, and this goal by itself provides adequate justification for implementing an emissions performance standard. In addition GEI standards provide greater clarity about the emissions reduction in the electricity sector and can encourage the use and development of CCS technology<sup>223</sup>.

381. Extrapolating these conclusions to the Australian context, the purpose of a condition imposing a 0.8 limit would be not only to mitigate GHG emissions in the short term, but to serve the following policy goals:

- (a) to avoid high-carbon infrastructure being constructed which will become economically unviable in the future (as the price of carbon permits increases);
- (b) as a result of (a), to reduce the long-term costs of GHG abatement; and
- (c) to support innovation and investment in low-carbon technology.

382. The opportunity to establish a benchmark is with the Tribunal at this moment. If, for any legal or technical reason the limit subsequently requires adjustment, this can be done by amending the licence and, if necessary, the works approval. There are mechanisms enabling this. Given the policy support in the Climate Change White Paper<sup>224</sup> for the 0.8 limit, it is submitted that this is the benchmark the Tribunal should adopt.

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<sup>220</sup> UK House of Commons, Energy and Climate Change Committee, Emissions Performance Standards, First Report of Session 2010-11, <http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee/inquiries/emissions-performance-standards/>, volume 1, p12 (paragraph 20)

<sup>221</sup> UK House of Commons, Energy and Climate Change Committee, Emissions Performance Standards, First Report of Session 2010-11, volume 1, p9-10 (paragraphs 16-17)

<sup>222</sup> UK House of Commons, Energy and Climate Change Committee, Emissions Performance Standards, First Report of Session 2010-11, volume 1, p10 (paragraph 18) and p15 (paragraph 34)

<sup>223</sup> UK House of Commons, Energy and Climate Change Committee, Emissions Performance Standards, First Report of Session 2010-11, volume 1, p16 (paragraphs 36-37) and p20 (paragraph 55)

<sup>224</sup> Victorian Government, Taking Action for Victoria's Future: Victorian Climate Change White Paper – Action Plan, July 2010, EPA.050.328 at EPA.050.340; Victorian Government, Taking Action for Victoria's Future: Climate Change White Paper – The Implementation Plan, October 2010, EPA.050.361 at EPA.050.381

383. The Tribunal has indicated that if it confirms the EPA's decision on the works approval it will specify whether the 0.8 limit in condition 2.1 is on an "as generated" or "as sent out" basis and requested that the EPA indicate its position in this regard<sup>225</sup>.
384. The EPA is an agency of Government, and within the parameters of its legislative responsibilities it is duty bound to be cognizant of Government policy. It will therefore implement whatever policy standard is eventually adopted. However, as previously stated, the EPA accepts that in the current environment of policy uncertainty, it is appropriate to require the DGDP to be designed with a 0.8 "as sent out" standard in mind. This will also avoid any potential inconsistency with subsequent licence conditions.

### **14.3 Application of SEPP (AQM) to GHG emissions**

385. SEPP (AQM) does not contain any emission limits or design criteria for CO<sub>2</sub> emissions.
386. This, presumably, is the basis on which Dual Gas alleges that "The reduction in plant and electricity capacity ... is not required by any relevant State environmental protection policy"<sup>226</sup>.
387. However, as previously set out, the policy requirements pertaining to best practice and the principles determine qualitatively the standards which must be met in the management of emissions. Clause 33 provides expressly that the best practice requirements of clauses 18 and 19 of the policy apply to greenhouse gas emissions, as do the principles, which pervade the policy.

### **14.4 Best practice**

388. The EPA accepts that the proposed DGDP has a lower GEI than other brown coal power plants (even without the dilution of emissions due to the use of natural gas<sup>227</sup>). However, that is not the end of the best practice enquiry.
389. Whilst not agreeing with the objectors that the EPA's decision to compare the works with other coal fired power generators is incorrect<sup>228</sup>, the EPA considers that electricity generation from natural gas is also a relevant industry sector or activity, given that the plant (or parts of it) may/will operate solely on natural gas.
390. As outlined above, both sectors can and should inform the assessment of the techniques, methods, processes or technology that Dual Gas proposes to use in order

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<sup>225</sup> EPA, opening submissions, P400 L26

<sup>226</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.013 (paragraph 5(b)(v))

<sup>227</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.401-R (paragraph 64)

<sup>228</sup> EV/LIVE, outline of submissions, 26 October 2011, p8-10 (paragraphs 38-40); DEA, Further Particulars - Statement of Grounds, ground 1, DEA.460.014; Shield, Further and Better Particulars in response to Order 16 of the Tribunal's Orders of 19 July 2011, MSH.560.021 at MSH.560.023 (section 2.1)

to determine whether alternatives that would demonstrably reduce the emissions from the DGDP are practically available.

***Is an alternative class of gas turbine that would demonstrably reduce the greenhouse gas emissions from the DGDP practically available?***

391. There are a number of different “classes” of gas turbine available for the generation of electricity. The class is generally denoted by a letter from A onwards, with classes later in the alphabet being more efficient (and therefore having a lower GEI). The higher class gas turbines (classes F and above) achieve higher efficiency through higher temperatures and pressures. As a result the higher class turbines are more sensitive to changes in fuel composition than the older E class and lower turbines.
392. It is generally accepted that an F class turbine is approximately 12% more efficient than an E class gas turbine<sup>229</sup>, and therefore generates less GHG emissions per unit of electricity generated.
393. The 12% figure is based on typical E class and F class combined cycle gas turbines (CCGT) operating on natural gas only and with the same controls (eg dry low NO<sub>x</sub> burners).

***The best gas turbine available for syngas***

394. Dual Gas has claimed that an E class gas turbine is the best it is able to secure at this time because no manufacturer is willing to offer an F class gas turbine to operate on syngas produced by the DGDP with the necessary guarantees and warranties<sup>230</sup>.
395. Mr McIntosh agreed with Dual Gas that an E class turbine is the best turbine that is currently available for use with syngas from the DGDP<sup>231</sup>. In particular, he accepted Dual Gas's claim that it was not able to purchase an F class gas turbine to operate on syngas from the DGDP<sup>232</sup>.
396. Mr Tsesmelis's provisional opinion was that a syngas-capable F class gas turbine would represent best technology from an environmental perspective, but that was based on the proviso that comprehensive information is provided to the gas turbine manufacturer, burner tests may need to be completed, there is a genuine dialogue and co-operation between the buyer and the vendor, and major modifications to the syngas capable F class machine would not be required. If major modifications were required, Mr Tsesmelis considers that this would realistically preclude the use of an F class gas

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<sup>229</sup> Blatchford, examination, P727 L22-25; Tsesmelis, examination, P937 L5-12

<sup>230</sup> Walton, further witness statement in response to expert evidence from J Washusen and CM Tsesmelis, p8

<sup>231</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.393-R (paragraph 18)

<sup>232</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.408-R (paragraph 89)

turbine for the time being<sup>233</sup>. Mr Tsesmelis also accepted that there is less technical risk for the DGDP if it is built using an E class turbine rather than an F class turbine<sup>234</sup>.

397. Worldwide, there are a number of F class gas turbines operating on syngas in 60Hz areas and two F class turbines operating on syngas in 50Hz areas (Puertellano, Spain and Negishi, Japan)<sup>235</sup>.

398. However, modifications are required to gas turbines in order to operate them on syngas and while the basic chemical composition of syngas is the same, the quality of the syngas produced from different gasification processes varies considerably, and this impacts on the selection of the gas turbine and the modifications necessary.<sup>236</sup>

399. The EPA accepts Dual Gas's claim that it is not currently able to secure an F class gas turbine that is capable of operating on the syngas that will be produced by the DGDP and therefore operating an E class gas turbine on the DGDP's syngas is currently consistent with the application of best practice in accordance with SEPP (AQM).

***Prospect of an F-class syngas-compatible turbine becoming available during the next five years***

400. Mr Walton stated that it will not be possible for Dual Gas to use anything other than an E-Class gas turbine for the foreseeable future as there is not enough of a market for a gas turbine manufacturer to redesign F-class turbines for syngas produced by the DGDP<sup>237</sup>.

401. However, this statement is not consistent with his acknowledgement that there is development occurring all the time in the gas turbine area and new opportunities will come on the market seeking to secure the business of companies such as Dual Gas<sup>238</sup>.

402. Also, on one hand Mr Walton argues that gas turbine manufactures would not see a market to modify F-class turbines for DGDP quality syngas, while on the other hand he emphasises the large potential market for IDGCC technology worldwide if the DGDP is successful<sup>239</sup>.

403. The EPA submits that it is conceivable that gas turbine manufacturers would invest in developing an F-class turbine for this specific syngas once HRL's IDG technology is proven at a commercial scale.

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<sup>233</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.006 (paragraph 6); Tsesmelis, examination, P941 L29-P942 L15

<sup>234</sup> Tsesmelis, cross-examination, P967 L16-19; Tsesmelis, cross-examination, P970 L26-31

<sup>235</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.408-R (paragraph 87)

<sup>236</sup> Tsesmelis, examination, P937 L27-P941 L5; Blatchford, examination, P707 L22-P710 L14; McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.504-505 (paragraphs 60-63)

<sup>237</sup> Walton, witness statement, DGA.200.115 at DGA.200.122; Walton, examination, P1257 L1-P1258 L4

<sup>238</sup> Walton, cross-examination, P1410 L2-12

<sup>239</sup> Walton, cross-examination, P1411 L24-P1412 L2

404. In Mr Tsesmelis's expert opinion, it is very likely that an F-class gas turbine will be available for the syngas produced by the DGDP in the next five years (if it is not already available now), noting that:
- (a) leading gas turbine manufacturers currently offer 50Hz syngas capable turbines in their portfolio;<sup>240</sup>
  - (b) all major gas turbine manufacturers are developing syngas technology for their existing natural gas turbines; and
  - (c) demand for high efficiency syngas turbine technology is increasing, resulting from the anticipated demand for gas turbines that can function on the high hydrogen/nitrogen diluent fuels resulting from pre-combustion carbon capture and storage technology.<sup>241</sup>
405. Mr McIntosh also expects that a more advanced gas turbine will become available for use with DGDP quality syngas in the next 5 years.<sup>242</sup>
406. In particular, Mr McIntosh highlighted that there is substantial investment by both the US Department of Energy and the European Commission to get higher technology turbines in operation with syngas fuels<sup>243</sup>.
407. In summary, while acknowledging that it is difficult to predict future trends in technology development, it is clear that:
- (a) the use of syngas in higher-class gas turbines is a growing area in which technology is developing rapidly, driven by the demand for lower emissions intensity electricity generation plants that utilise low-rank fuels and the development of pre-combustion carbon capture and storage;
  - (b) there is significant investment in the development of gas turbine technology for use with syngas worldwide, and F-Class turbines are already being used with syngas of a different quality to that produced by the DGDP; and
  - (c) after Dual Gas proves HRL's gasification technology at this scale gas turbine manufacturers are likely to be more interested in working with Dual Gas/HRL to modify F-Class gas turbines to operate on the syngas produced by that technology.
408. This suggests that the best practice turbine for Stage 2 (at the time it is scheduled to be implemented) is likely to differ from the E-class turbine now proposed.

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<sup>240</sup> Tsesmelis, expert witness statement by way of reply, EPA.100.507 at EPA.100.515 (paragraph 51)

<sup>241</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.026 (paragraphs 84-85); Tsesmelis, examination, P944, L3-31; Blatchford, witness statement, DGA.200.067 at DGA.200.074-076

<sup>242</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.393-R (paragraph 20)

<sup>243</sup> McIntosh, cross-examination, P1063 L26-P1064-L9

### ***The best turbine available for natural gas***

409. Expert witnesses called by the EPA and Dual Gas agree that an F class or better turbine is the best technology for generating power from natural gas alone as it generates lower GHG emissions per MWh of electricity compared to an E class turbine<sup>244</sup>.
410. There are currently 5 F class or equivalent gas turbines operating on natural gas in Australia<sup>245</sup>.
411. In Mr McIntosh's expert opinion, the Tallawarra (and Swanbank E) F class equivalent, single shaft turbines represent the application of best practice in the generation of electricity from natural gas, with an estimated GEI of 0.34 tCO<sub>2</sub>-e/MWh generated<sup>246</sup>. Mr McIntosh also referred to the Australian Greenhouse Office's New Power Plant Standard for CCGT plants of 0.35 tCO<sub>2</sub>-e/MWh generated<sup>247</sup>.
412. Dual Gas proposes to operate GT2 solely on natural gas during Stage 1<sup>248</sup> and potentially both turbines for the duration of the project (if Dual Gas's Case 4 "non-success" operating scenario eventuates). The estimated lifetime project average GEI for Case 4 is 0.45 tCO<sub>2</sub>-e/MWh generated, which includes the use of syngas for the first four years.
413. The EPA submits that Dual Gas's proposal to use an E class gas turbine to operate solely on natural gas is inconsistent with its obligation under SEPP (AQM) to apply best practice to the management of its GHG emissions, as F class gas turbines generate less GHG emissions per MWh of electricity and are used in the "electricity generation from natural gas" industry sector or activity.

### ***Comparative emissions from E class and F class turbines***

414. In Mr Blatchford's opinion, the additional GHG emissions that would be generated because GT2 is an E class rather than an F class turbine are not material<sup>249</sup>.
415. Mr Blatchford stated that GT2 would only operate for 30% of the year (during the period it operates solely on natural gas), due to the purchase price for electricity in the NEM and the cost of natural gas as a fuel<sup>250</sup>.
416. On that basis, Mr Blatchford calculated that the emissions difference between an E and an F class gas turbine would be 44,000 tCO<sub>2</sub>-e/year<sup>251</sup>. He then compared that figure

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<sup>244</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.393-R (paragraph 19); Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.006 (paragraph 7); Blatchford, examination, P727 L22-25 and cross-examination, P800 L 13-17

<sup>245</sup> McIntosh, P1034 L20-22

<sup>246</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.502 (paragraph 41)

<sup>247</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.502 (paragraph 45)

<sup>248</sup> Blatchford, examination, P729 L27-31

<sup>249</sup> Blatchford, examination, P729 L3-6

<sup>250</sup> Blatchford, examination, P727 L25-30 and P728 L4-9

to emissions from the Hazelwood power station, concluding that the additional GHG emissions that would be generated are equivalent to 20 hrs/year of Hazelwood output (at full load)<sup>252</sup>.

417. While technically accurate, these comparisons are misleading.
418. There is nothing to prevent Dual Gas from operating GT2 during the relevant period for more than 30% of the year and it is conceivable that it may be economically attractive for it to do so in the future. For example, if GT2 is operated for 80% of the year, the DGDP would generate an additional 117,333 tCO<sub>2</sub>-e per year and, if Stage 2 is not operational before the 2016/17 financial year, an additional approximately 470,000 tCO<sub>2</sub>-e in total during Stage 1.
419. Further, the Hazelwood comparison is misleading as it compares the emissions difference in relation to a gas turbine that is assumed will only operate for a small number of hours per year with a plant that is over 5 times the size (1600MW), runs most of the year, and is the least efficient brown coal fuelled plant in Australia<sup>253</sup>.
420. Mr Blatchford has also made a number of comparisons of the efficiency of F class open cycle gas turbines (**OCGT**) against E class CCGT. The comparison of OCGT against CCGT is inappropriate as OCGT only operate as “peak load” for a very small percentage of the year<sup>254</sup>.
421. It appears that Mr Blatchford was claiming that the emissions from GT2 operating on natural gas for 20% of the year would be the same as the emissions from an F class OCGT plant operating for 5% of the year<sup>255</sup>. This statement is incorrect because an F class turbine has a much greater capacity than an E class turbine and will use approximately 45% more natural gas per hour (meaning that it will generate approximately 45% more GHG emissions). Consequently, operating an E class turbine for 20% of the year will generate approximately 2.5 times more GHG emissions than operating an F class turbine for 5% of the year.
422. The EPA submits that the difference in efficiency between E class and F class gas turbines, with the resulting reduction in the GEI of the plant means that .by proposing that GT2 be an E class turbine Dual Gas is not applying best practice to the management of its GHG emissions.

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<sup>251</sup> Blatchford, examination, P728 L24-27

<sup>252</sup> Blatchford, PowerPoint presentation shown to Tribunal during examination, 3 November 2011, at p36

<sup>253</sup> McIntosh, examination, P1045 L12-22

<sup>254</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.502 (paragraphs 39-40); Walton, examination, P1293 L8-P1294 L4

<sup>255</sup> Blatchford, examination, P731 L16-29

***Is an alternative gasifier that would demonstrably reduce the GHG emissions from the DGDP practically available?***

423. Mr McIntosh considered alternative gasifier technologies in order to assess whether an alternative gasifier that would reduce GHG emissions from DGDP is practically available.
424. Mr McIntosh noted that a novel feature of the air-blown fluidised bed gasifier that Dual Gas is proposing to use is that it integrates drying in the gasification unit, which is important as there is currently no established technology for efficient large scale pre-drying of coal for electricity generation<sup>256</sup>.
425. He accepted Dual Gas's claim that the properties of Victorian brown coal and the integrated drying used in the IDG process mean that an entrained flow gasifier could not be used efficiently at this time. Also, he agreed that while an oxygen blown fluidised bed gasifier could produce a higher specific energy syngas and enhance CO<sub>2</sub> capture, it would require an air separation unit which would increase capital cost and auxiliary electricity usage on site and hence reduce efficiency<sup>257</sup>.
426. Mr McIntosh concluded that there is no alternative gasifier currently available that would be a reasonable alternative to the gasifier proposed by Dual Gas and that would reduce the environmental impact of the DGDP<sup>258</sup>.
427. Mr Tsesmelis also considered alternative gasifier technologies. However, without the benefit of the information Dual Gas claims is confidential, he was not able to form a view as to whether an alternative gasifier which could produce electricity with a lower environmental impact is practically available. This was because he did not have sufficient information to determine whether other gasifiers (in particular entrained flow gasifiers) could be used with Victorian brown coal<sup>259</sup>.
428. However, Mr Tsesmelis did have sufficient information to conclude that the nature of Latrobe Valley brown coal would preclude the use of higher temperature fluidised bed gasifiers<sup>260</sup>.
429. The EPA is satisfied that Dual Gas's proposal to use HRL's gasifier technology in the DGDP is consistent with the application of best practice in accordance with clause 19(1) and 33(1) of SEPP (AQM) at this time.

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<sup>256</sup> McIntosh, expert witness statement, EPA.100.307-R at EPA.100.403-R (paragraph 75); McIntosh, examination, P1029 L19-29.

<sup>257</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.405-R (paragraph 77); McIntosh, examination, P1032 L19-P1033 L14.

<sup>258</sup> McIntosh, expert witness statement, EPA.100.307-R at EPA.100.406-R (paragraph 78)

<sup>259</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.020 (paragraph 65); Tsesmelis, examination, P935 L8-19

<sup>260</sup> Tsesmelis, examination, P934 L22-P935 L5

### ***Prospect of improvements in gasifier technology over the next five years***

430. Mr Tsesmelis advised that the market for gasification technology is currently very competitive and that alternative gasifier technologies are being developed which can gasify dried lignite (brown coal)<sup>261</sup>. He concluded that it is extremely likely that there will be on-going improvements to gasification technology in the next 5 years, due to the predicted significant growth in gasification capacity around the world<sup>262</sup>.

### ***Conclusion***

431. The EPA submits that Dual Gas's proposal to use an E class gas turbine to operate solely on natural gas is inconsistent with its obligation under SEPP (AQM) to apply best practice to the management of its GHG emissions and therefore approval should not be granted for GT2 to operate during Stage 1.
432. The EPA is satisfied that, in other respects, Dual Gas is proposing to apply best practice to the management of the GHG emissions from the DGDP.

## **14.5 Application of the principles of environment protection**

433. In *Gray*<sup>263</sup>, the key NSW case applying the principles of ecologically sustainable development in a climate change context, Pain J noted that:

Numerous decisions of this Court have confirmed the importance of ESD principles for decision makers making decisions under legislation which adopts ESD principles, see for example *Murrumbidgee Ground-Water Preservation Association v Minister for National Resources* [2004] NSWLEC 122 at [128], *BGP Properties v Lake Macquarie Council* (2004) 138 LGERA 237, *Bentley v BGP Properties Pty Ltd* (2006) 145 LGERA 243, *BT Goldsmith Planning Services Pty Ltd v Blacktown City Council* [2005] NSWLEC 210; *Telstra v Hornsby* [2006] NSWLEC 133; (2006) 146 LGERA 10.

434. None of the parties in the present case have denied that the precautionary principle applies to the decision in the context of climate change (although Dual Gas has not positively affirmed that it does).

### ***Do the precautionary principle, the principle of inter-generational equity or the principle of conservation of biological diversity require rejection of the proposal?***

435. As previously noted, none of the principles is absolute and in certain respects they moderate one another. If the effect of the precautionary principle were that any

<sup>261</sup> Tsesmelis, cross examination, P1005 L 28-P1006 L9

<sup>262</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.005 (paragraph 4)

<sup>263</sup> *Gray v Minister for Planning* [2006] NSWLEC 720; (2006) 152 LGERA 258

proposal to which the principle applies must be refused, there would be no scope for operation of the integration principle. Instead, the precautionary principle requires the decision-maker to include potential (but scientifically uncertain) impacts in his/her calculus when arriving at a decision<sup>264</sup>. It is procedural, rather than substantive, in that it changes the onus of proof in relation to such risks and requires a decision-maker, when applying the other principles, to assume that serious and irreversible environmental harm will occur.

436. It is further submitted that, if the precautionary principle applies in a given scenario (such as climate change) and the risks in question could affect inter-generational equity and/or the conservation of biological diversity and ecological integrity, the consequence is that (a) the risks to inter-generational equity and biological diversity must be assumed to have those anticipated effects; and (b) those effects will then inform the decision-maker's overall calculus.

437. In *Gray - Pain J* referred to the relationship between these principles in the following terms<sup>265</sup>:

The precautionary principle is part of the bundle of ESD principles identified in s 6(2) of the PEA Act such as intergenerational equity and the conservation of biological diversity and ecological integrity. While not all of these were relied on by the Applicant I observe that there is a clear connection between climate change/global warming resulting in possibly permanent climatic change and the conservation of biological diversity and ecological integrity which are likely to be impacted upon. I have referred earlier to the principle of intergenerational equity (par 122) and observe that the approach to environmental assessment required by the application of the precautionary principle requires knowledge of impacts which are cumulative, on going and long term. In the context of climate change/global warming there is considerable overlap between the environmental assessment requirements to enable these two aspects of ESD to be adequately dealt with.

438. An integrated approach which acknowledges the common substance between the precautionary principle, principle of intergenerational equity and conservation of biological diversity in the climate change context is more satisfying conceptually and less cumbersome and repetitive than applying each individual principle to alleged GHG impacts. That is, if one accepts that the precautionary principle applies to climate change and that the risks associated with climate change have a bearing on both

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<sup>264</sup> *Telstra Corporation Ltd v Hornsby Shire Council* [2006] NSWLEC133; (2006) 146 LGERA 10; (2006) 67 NSWLR 256 at [154]

<sup>265</sup> *Gray v Minister for Planning* [2006] NSWLEC 720; (2006) 152 LGERA 258 at [134]

intergenerational equity and conservation of biological diversity, the three principles justifiably merge into a single set of climate change considerations.

### ***Application of the precautionary principle***

439. As set out in its opening submissions, the EPA submits that the precautionary principle applies to the GHG aspects of the DGD in that – (a) there is a risk of serious and irreversible harm (having regard to cumulative global impacts); and (b) there is a lack of scientific certainty about the precise nature, pace and extent of anthropocentric climate change.
440. The application of the precautionary principle to climate change and GHG emissions has been accepted in case law<sup>266</sup> and is recognised legislatively in section 10(2) of the CC Act.
441. Applying the *Telstra / Brown Mountain* criteria, it is clear that the climate change risks posed by increasing levels of GHG emissions are of the greatest possible magnitude (both geographic and temporal), have global as well as local implications, are complex and in all likelihood irreversible, are a matter of grave public concern and are not readily manageable through adaptive management. Further, the risks are supported by a large and credible body of scientific opinion.
442. At the same time, there is scientific uncertainty about the pace of climate change and the role of anthropogenic GHG emissions in bringing it about. There is also scientific uncertainty about the manageability and reversibility of climate change, which includes the policy uncertainty surrounding global and local measures to limit climate change by reducing GHG emissions as against an adopted baseline.
443. For all these reasons, the EPA considers that it is incontrovertible that the precautionary principle is triggered.
444. The key effect of the precautionary principle is to increase the weight of the environmental risks which fall within the principle and to shift the onus of proof with respect to the reality and scale of the claimed environmental risks and the prospect of them coming to pass. In Jacqueline Peel's words in *The Precautionary Principle in Practice – Environmental Decision-Making and Scientific Uncertainty*<sup>267</sup> (**Peel**):

...as a result of applying the precautionary principle, the environment would be given the 'benefit of the doubt' in conditions of uncertainty so that the subsequent balancing of factors in the decision-making process takes place on the basis of an assumption that environmental impacts could occur.

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<sup>266</sup> *Environment East Gippsland Inc v VicForests* [2010] VSC 335; *Western Water v Rozen* [2008] VSC 382; *Alanvale Pty Ltd & Anor v Southern Rural Water & Ors* [2010] VCAT 480; *Archibald v Moorabool SC* [2010] VCAT 163; *Rozen v Macedon Ranges SC* (Red Dot) [2009] VCAT 2746; *Walker v Minister for Planning* [2007] NSWLEC 741; *Minister for Planning v Walker* [2008] NSWCA 224; *Gray v Minister for Planning* [2006] NSWLEC 720; (2006) 152 LGERA 258.

<sup>267</sup> Peel, *The Precautionary Principle in Practice – Environmental Decision-Making and Scientific Uncertainty*, The Federation Press 2005, at p155

445. Dual Gas has made no attempt to discharge this onus (and would be hard-pressed to do so).
446. On the other hand, the grounds of appeal asserting that the precautionary principle requires the project to be refused are incorrect in implying that this is the only available course of action if the precautionary principle is found to apply. Instead, they must be understood to say that, in the opinion of those parties, the most appropriate risk-weighted option, given the gravity of the likely effects of climate change, is refusal.
447. The EPA has assessed the risk-weighted consequences of approving the full 600MW DGDP, as required under the precautionary principle.
448. In the context of the urgent need to curtail the generation of greenhouse gases and the associated need to employ the most eco-efficient technology, it considers that approving the full 600MW project may “lock-in” technology that, by the time of its proposed deployment in Stage 2, may have been superseded by more efficient and less environmentally damaging alternatives.
449. This is a particular risk in this case as, by the commencement of Stage 2, there are likely to have been improvements in gas turbine technology such that an F class gas turbine may be available for operation on syngas from the DGDP and there may also be improvements in gasification technology which Dual Gas could adopt.
450. The EPA has also considered the risk-weighted consequences of the other options – refusing the works approval application and permitting a single process train (i.e. one IDG and CCGT).
451. Taking account of the measures being implemented nationally and internationally to reduce the world’s carbon emissions trajectory and the DGDP’s potential to contribute to the solution as well as the problem of overall levels of GHG emissions, the EPA considers that the appropriate option is to approve the project at a scale which (on the evidence) enables the syngas technology to be tested in a commercial environment but with the least practicable consequence for Victoria’s overall level of GHG emissions.
452. The option which meets these objectives is a single process train to demonstrate the technology.
453. Requiring Stage 2 to be assessed at the time that Dual Gas wishes to proceed with it (which is estimated to be in 2016/17 if the demonstration is successful) will enable the second process train to be assessed in light of the technology that is reasonably available at that time, and in the context of the legislative and policy framework that is in place.

454. This approach is consistent with section 19CA of the EP Act, which provides that the EPA may specify in a works approval a date on which the approval shall expire if the works have not commenced and that the works approval shall expire if the works have not been commenced by that date. The purpose of that section is to ensure that approval for works which have not commenced does not extend to a number of years after the grant of the works approval and the works require re-approval in light of current conditions and requirements.
455. This outcome of the application of the precautionary principle is subject to the other principles of environment protection.
456. As Peel notes<sup>268</sup>:

Even in merits review (which is a feature of many areas of development control and resource management in Australia) courts will generally be deferential to decision-makers' 'weighing' of environmental and development interests, provided decision-makers have engaged in 'a broad, sound and fair process for decision-making' to reach decisions on measures to address health or environmental threats. In conditions of imperfect scientific knowledge this approach has substantial merit as, at most, decision-making will be able to assure an open and defensible 'balancing' of environmental, social and economic factors. Whether the 'best' conclusion is reached in the end result is usually only something that can be determined with hindsight. The critical issue for decision-makers in these circumstances is that of ensuring that uncertainties over health and environmental impacts do not prevent these factors playing a role on par with social and economic concerns in the decision-making process.

***Application of the principle of inter-generational equity in a climate change context***

457. The overlap between the precautionary principle and the principle of inter-generational equity is apparent from EV/LIVE's further and better particulars of ground 1(d), which state that:
- (a) The proposed levels of emissions will significantly contribute to dangerous climate change.
  - (b) Climate change is likely to have significant adverse effects on the health, diversity and productivity of the environment.
  - (c) Accordingly, the approval is inconsistent with the principle of intergenerational equity.

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<sup>268</sup> Peel, *The Precautionary Principle in Practice – Environmental Decision-Making and Scientific Uncertainty*, The Federation Press, 2005, at p221

458. DEA, similarly, claim that “the proper application of the principle of Intergenerational Equity requires proper consideration of the health impacts on future generations from the release of greenhouse gases ...”<sup>269</sup>. They adduce, in support, broad statements to the effect that climate change is the biggest global health risk of the 21<sup>st</sup> century.
459. Mr Shield says in his opening submissions<sup>270</sup> that “Obviously, the principle of intergenerational equity, for example, must be contradicted by the implied emissions trajectory that would result in dangerous climate change”.
460. Expressed in these loose terms, the principle contributes little over and above the consideration of the risk-weighted options under the precautionary principle.
461. However, in *Taralga Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* [2007] NSWLEC 59; (2007) 161 LGERA 1 (a windfarm case) Preston CJ went a step further by identifying one of “two requirements” for the attainment of intergenerational equity in the production of energy as being<sup>271</sup>:
- ... as far as is practicable, to increasingly substitute energy sources that result in less greenhouse gas emissions, thereby reducing the cumulative and long term effects caused by anthropogenic climate change. In this way, the present generation reduces the adverse consequences for future generations.
462. At least superficially this statement lends support to the proposition that, in pursuit of intergenerational equity, energy generation from coal should no longer be permitted, given the availability of “cleaner” fuel sources.
463. However, there are three riders to this. First, the requirement is not (and cannot be) absolute. There is an issue of practicability (both physical and economic). Second, despite the fact that the DGDP operating on syngas will be more GHG intensive than facilities fuelled by renewable sources or natural gas, it may in fact contribute to that trend by promoting the use of a coal-based process that is less GHG intensive than traditional coal-based technologies. Although Preston CJ’s comments are contextualised by Taralga’s focus on windfarms, he does not say that the less GHG intensive facilities must be based on renewable energy or natural gas: merely that less GHG intensive sources of energy generation should be substituted for more highly GHG intensive current stock. Third, and most importantly, the principle is only one of the “package” of principles and does not have over-riding weight.

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<sup>269</sup> DEA, Further and Better Particulars, 28 September 2011, DEA.460.019 at DEA.460.028 (paragraph 5(b))

<sup>270</sup> Shield, opening submissions, P663 L25

<sup>271</sup> *Taralga Guardians Inc v Minister for Planning and RES Southern Cross Pty Ltd* [2007] NSWLEC 59; (2007) 161 LGERA 1 at [74]

464. The EPA agrees that intergenerational equity may be compromised if GHG emissions are increased or continue unabated such that the principles enunciated by Pain J in *Gray* are infringed.
465. Pain J's judicial review findings centred on the Director-General's failure to consider cumulative impacts and to quantify the scope 3 GHG emissions potentially arising from the proposed mine expansion. She held that general consideration of climate change was insufficient to discharge the decision-maker's specific obligation to consider intergenerational equity.
466. However, this outcome throws no light on how the principle is to be applied on the merits and the cases put forward by the objectors in relation to GHG emissions themselves simply appeal to the generic character of climate change to invoke the principle without applying it in any more specific sense.
467. The EPA agrees that the conservation of quality principle enunciated in *Gray* favours the use of electricity generation sources which are less GHG intensive than coal (even when deployed as syngas). However, this is not to say that technologies which exploit coal in new formats cannot contribute to the environmental reform of the energy sector and thereby serve the principle in a less direct way.
468. Further, in the context of the Victorian Minister's responsibility under the CC Act to achieve a (relative) target reduction in GHG emissions by 2020, which – according to the policy settings – will be done without prohibiting the development of new coal-based facilities, the EPA is simply not in a position to say that intergenerational equity in the form of conservation of quality will stand or fall because the DGDP is approved or otherwise (even considering GHG impacts cumulatively).
469. However, this is not to deny that approval of the DGDP will make conservation of quality a step more difficult, thereby adding weight to the precautionary conclusion that the project should be limited to a single process train to demonstrate the technology, with the minimum practicable GHG impact consistent with allowing the demonstration to occur and the acceptability of the second process train assessed at the time it is to be constructed.
470. With respect to the conservation of options and access, it is arguable that a "cleaner" coal technology may preserve the development options of future generations with respect to electricity generation (and other syngas applications) and help maintain their economic and social access to the coal resource. Although these permutations of the principles may be contrary to their general thrust, they cannot be altogether ruled out.

471. Again, the EPA considers that the application of these sub-principles favours allowing the project to proceed, but at a scale which poses least risk to the conservation of quality – i.e. one process train.

***Meaning of the principle of conservation of biological diversity in the context of climate change***

472. The EPA accepts that there is a clear connection between climate change and the conservation of biological diversity and ecological integrity which underpins the application of this principle.
473. EV/LIVE's grounds of appeal are framed similarly to its intergenerational equity grounds, with biological and ecological impacts substituted for the "health, diversity and productivity of the environment". Accordingly, their case is highly generic, relying on the intrinsic connection between the precautionary principle, the principle of intergenerational equity and this principle, as discussed in paragraphs 435 to 438 above. No evidence or quantification of likely impacts on biological diversity or ecological integrity has been provided.
474. Applying the approach adopted by Osborn J in *Brown Mountain*, it may therefore be more appropriate in these circumstances to rely on the precautionary principle.
475. If, as the precautionary principle requires the decision-maker to assume, anthropogenic climate may "fundamentally upset" ecosystem functioning and affect the "sum total of processes such as the cycling of matter, energy, and nutrients operating at the ecosystem level" on a global scale, this principle lends weight to the need for caution.

***Principle of the waste hierarchy***

476. This principle is about the *management* of waste. As the first rung of the hierarchy, avoidance is not prescriptive but encourages managers (and decision-makers) to think first about whether a given activity could be configured so as to avoid or partially avoid generating waste. The remainder of the hierarchy contemplates, and provides an "order of preference" for dealing with, "unavoidable" waste.
477. The hierarchy is generally understood to apply to waste generated by a particular facility or production process rather than to discriminate, at large, between wholly different forms of production.
478. However, consistent with its conceptualisation of "best practice", EV/LIVE claims that "The proposal fails to avoid or minimise waste [carbon dioxide] as far as possible in that it produces more carbon dioxide emissions per unit of power generated than other

forms of readily available power generation technology, including forms of power generation capable of providing baseload power”<sup>272</sup>.

479. In his Opening Submissions of behalf of EV/LIVE, Counsel for EV/LIVE claimed that the intent of climate change policy is “at its core very simple” and is an emanation of the waste hierarchy: “Avoid creating wasteful emissions, minimise them, if you can’t avoid them”.<sup>273</sup> Similarly, he described “eco-efficiency” (as it appears in the definition of best practice) as “a living, breathing implementation of the waste hierarchy”.<sup>274</sup>
480. In our submission, the flaw in this argument is its assumption that the hierarchy is, in effect, limited to its first rung.
481. Further, the logic of Counsel for EV/LIVE’s position is that only one (i.e. the most eco-efficient) mode of producing a particular product would ever be permitted, because any other means of production would entail less “avoidance”. This is simply not how the Victorian economy works or is intended to work.
482. Nor is there practice or case law to support such an approach. To the contrary, the waste hierarchy is applied by the EPA in the form of licence conditions and environmental improvement plans adapted to the nature of each particular facility. It has never been used to dictate the primary inputs from which an industry product is produced.

### ***Principle of Accountability***

483. As set out in its Opening Submissions, the EPA contends that, on the facts, this principle is not relevant to the present matter.

### ***Principle of Integration of social, economic and environmental considerations***

484. In so far as they deal with the principles, Dual Gas’s further and better particulars and opening submissions adopt the simplistic position that the principle of integration means that each allegedly adverse economic and social impact mechanically re-weighs the balance in favour of the original Dual Gas proposal.
485. For example, one of Dual Gas’s “further and better particulars” is to the effect that the approved integrated 300MW facility will produce electricity at a higher cost per unit than the proposed integrated 600MW facility and will operate marginally less efficiently than an integrated 600MW facility.<sup>275</sup>

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<sup>272</sup> EV/LIVE, Further and Better Particulars, 5 September 2011, EVL.360.041 at EVL.360.043 (paragraph 5(c))

<sup>273</sup> EV/LIVE, opening submission P610 L22-23

<sup>274</sup> EV/LIVE, opening submission P641 L2-3

<sup>275</sup> Dual gas, Further and Better Particulars, DGA.260.028 at DGA.260.030 (paragraph 4(a))

486. In the complex calculus mandated by the principle such things may have little weight as against the lower overall volume of GHG emitted by the reduced plant and even less when integrated with “the need to improve community well-being and the benefit of future generations”.
487. In the absence of any evidence of the broader social and economic impacts of a higher cost per unit (supposing it to be the case), the fact that Dual Gas may be less competitive in the market is of little importance to the public interest to which the principle is addressed. A higher and therefore less competitively priced product, it might be said, always results from environmental “imposts”, but does not mean that the impost is unjustified or that the overall public good is not served by it.
488. It is submitted that, of the matters particularised by Dual Gas, only the following bear upon the public interest:
- (a) the claim that the DGD will introduce jobs into a community in need and therefore generate social and economic advantages<sup>276</sup>;
  - (b) the “social benefit” of using the huge resource of ~36,800 million tonnes of economic coal. “Brown coal reserves are sufficient to supply Victoria’s energy needs for approximately 500 years at current rates of consumption.”<sup>277</sup>;
  - (c) the alleged “global relevance” of the technology<sup>278</sup> including its potential to contribute to the displacement of existing (high emissions intensity) sources of baseload power generation; and
  - (d) its (disputed) ability to meet the need for greater electricity generation capacity in the National Energy Market, which may be exacerbated by the potential closure of up to 2000MW of coal-fired generation capacity contemplated as a component of the Federal Government’s Clean Energy Future Plan<sup>279</sup>.
489. The remainder refer to the proponent’s interest in, and claims in relation to, the project’s technical and economic viability.
490. These grounds and claims are dealt with in detail below. In summary, the EPA considers that the first three of the four matters set out in paragraph 488 have sufficient merit to warrant the project being approved in some form.
491. However, the EPA considers that the alleged benefits of a 600MW plant over a 300MW plant for the proponent are easily outweighed by concern for “community well-being

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<sup>276</sup> Dual Gas, opening submissions, P549 L21-P550 L9; SKM, Triple Bottom Line Analysis, EPA.020.111 at EPA.020.182, and EPA.020.195-EPA.020.196

<sup>277</sup> Dual Gas, opening submissions, P555 L5

<sup>278</sup> Dual Gas, opening submissions, P528 L26

<sup>279</sup> Dual Gas, outline of submissions, DGA.250.001 at DGA.250.025 (paragraph 82); Washusen, examination, P1342 L26-P1343 L7 and P1348 L2-13

and the benefit of future generations”, especially in combination with the precautionary principle and the principle of intergenerational equity.

492. Finally, the EPA submits that no weight ought to be given to the triple bottom line assessment undertaken by SKM (with an unknown author) as it was not brought into evidence or tested through cross-examination during the hearing. If the Tribunal is minded to give that assessment any weight, the EPA considers that the assessment was deficient in a number of respects (particularly in its failure to assess the various project impacts in an integrated way) and supports the criticisms of the assessment by Dr Dey (on behalf of EV/LIVE).

### ***Summary of Assessment of GHG impacts***

493. The GEI of the proposed plant is significantly less than the GEI of existing coal-fired power stations in the Latrobe Valley. However, that comparison should not be accepted as a benchmark appropriate for assessing “best practice”.
494. On the other hand, the requirement to meet best practice does not require an activity to be converted in to an entirely different activity, albeit in the same industry. It does not mean that a coal-based power station proposal should be converted in to a windfarm proposal.
495. Rather, the “best practice” requirement in SEPP (AQM) requires a generator of emissions to manage its emissions by investigating and utilising technologies and processes which are in use in parallel activities elsewhere if these can feasibly be incorporated into the proposal, whether by addition or modification.
496. Although there is a distinction between “best practice” and emissions reduction “to the maximum extent practicable” (as required for class 3 indicators), “best practice” is not “second best practice”. If there are technologies or processes in use nationally or internationally which are practically available and can achieve a better environmental outcome, they should be adopted.
497. The EPA accepts that, by proposing to use an E-class gas turbine to generate electricity from syngas, Dual Gas is complying with its obligation to apply “best practice” (given the particular qualities of the syngas to be produced by the DGDP), but considers that the use of a second E class turbine (GT2) to generate electricity solely from natural gas is not consistent with best practice and should be refused. The EPA also considers that, allowing for the time interval, the use of GT2 to generate electricity from syngas is unlikely to constitute “best practice” at the time that Stage 2 is implemented.

498. For these reasons, the EPA considers that Stage 2 should be refused and, if and when appropriate, should form the subject of a further works approval application, and so GT2 should be excluded from Stage 1.
499. This will not affect the ability of the plant to “demonstrate” the technology, which was always proposed to occur on the basis of one syngas process train.
500. Whilst it is accepted that the EPA could have approved Stage 2, with a deferred GT2, it was considered that the appropriate precautionary response was to refuse Stage 2 (including GT2) so as to ensure a full reconsideration of both technology and policy at the relevant time.
501. In support of this approach, the works approval provisions of the EP Act do not encourage approvals with a long lead time to implementation. The expiry period recognises that it is inappropriate for the life of an approval to extend beyond a limited period after the technology and policy context has been assessed.
502. Acknowledging that the precautionary principle does not automatically compel refusal, a plant consisting of one process train was assessed as being the best “risk weighted option” given the scientific uncertainty surrounding climate change. It accepts the need for technical innovation, especially in the coal industry, but avoids GHG emissions surplus to the demonstration of the technology (noting the evidence to the effect that a single train is sufficient to “prove” the technology and the fact that GT2 was proposed to operate in association with, but not as part of, the evaluation of the syngas technology).
503. In the context of climate change, the precautionary principle, the principle of intergenerational equity, the principle of conservation of biological diversity and ecological integrity merge as one set of climate-change considerations, the application of which is guided by interaction with the CC Act.
504. In combination with the principle of integration of social, economic and environmental considerations, these principles require the Tribunal to adopt a “proportionate” response to climate change risk.
505. This need not mean that approval for the project is refused. In the context of the 20% target and consistency with other public objectives (such as the development of an alternative coal technology), it means following a course which avoids “gratuitous” emissions. The emissions from GT2 are gratuitous in that the project is proposed as a demonstration plant and they are not necessary to demonstrate the technology.
506. The considerations mandated by section 14 of the CC Act lead to the conclusion that the DGDP will make achievement of the 20% target more difficult in the short term and may or may not contribute to reductions in the longer term. Whilst the 20% target is not

the primary reason for the reduction in scale, the reduced GHG emissions associated with the smaller scale plant will, as a matter of logic, make the target relatively more achievable.

507. The calculation of the plant's GHG emissions assumes a GEI which accords with the 0.8 limit. Although this is largely an operational matter, the EPA has required the plant to be designed so that it is capable of meeting that limit. This is consistent with the performance-based approach to design specification and with the requirement of consistency in section 20(7) of the EP Act.
508. A GEI of 0.8 ("as generated" or "as sent out") is achievable by operating the plant for some of the year on natural gas and has been accepted by Dual Gas, although at the hearing Dual Gas has argued for the lesser ("as generated") standard.
509. Although the 0.8 limit is not "best practice" as such, it is the target GEI for new power stations which Victoria has espoused at a policy level.
510. Despite the Commonwealth Government's decision not to separately regulate GEI in the context of the carbon pricing mechanism, this is not the current position in Victoria and the EPA submits there is strong policy support for the adoption of the 0.8 limit (on such basis as the Tribunal determines) as a condition of the works approval. The opportunity to create an "expectation" (at least) of such a condition is before the Tribunal and in our submission should be exercised in satisfaction of the precautionary principle and the Tribunal's decision-making responsibilities under the CC Act.
511. By its nature, the carbon pricing mechanism will not be effective to achieve short-term reform of the electricity generation sector and to address the special predicament of Victoria's high level of brown coal dependency.
512. For all of these reasons, the DGDP should be restricted to one (300MW) process train and subject to a design requirement which anticipates an operating requirement to meet the 0.8 limit.

## 15 Dual Gas's Grounds of Review on the Reduction in Capacity

513. During the hearing, Dual Gas's and the EPA's witnesses gave evidence on the technical and economic implications of reducing the capacity of the DGDP from 600MW to 300MW and whether a 300MW plant would be sufficient for Dual Gas to technically and commercially demonstrate HRL's novel IDG technology.

## 15.1 Common Ground

514. The witnesses agreed that a number of changes to the design of the DGDP would be required as a result of the reduction of capacity from 600MW to 300MW.
515. These changes involve:
- (a) removing GT2;
  - (b) changing the configuration of the plant from a 2 x 1 configuration (where 2 gas turbines are connected to one large steam turbine) to a 1 x 1 configuration (where one gas turbine is connected to a smaller steam turbine); and
  - (c) associated changes to supporting infrastructure (eg. changes to HV switchyards and the energy flow balance through the facility, modifications to control systems and administration facilities)<sup>280</sup>.
516. These changes will result in:
- (a) lower overall capital costs, but are likely to result in higher per unit capital costs (however the extent of the increase in per unit capital costs is disputed);
  - (b) marginally lower efficiency for the steam turbine (0.3% in percentage points)<sup>281</sup>; and
  - (c) reduced flexibility to run the plant at some capacity when undertaking maintenance on the proposed first E-class gas turbine (**GT1**) (although Mr McIntosh considers that maintenance could be scheduled during periods of known reduced demand to mitigate this impact<sup>282</sup>).
517. The design and operation of the proposed first integrated drying and gasification unit (**IDG1**) and GT1 would remain unchanged in the 300MW plant.
518. The EPA accepts that, if the demonstration is successful and Dual Gas wishes to construct a second train, it is likely that it would not be feasible to convert the 300MW plant to a 2 x 1 configuration and, rather, Dual Gas would need to construct the second train in a stand-alone 1 x 1 configuration.

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<sup>280</sup> Blatchford, expert witness statement, DGA.200.067 at DGA.200.071; Walton, examination, P1236 L22-30

<sup>281</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.498 (paragraph 12); Walton, examination, P1238 L4 and P1264 L3-8

<sup>282</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.504 (paragraph 59)

## 15.2 Technical Implications

### *Extent of plant redesign required*

519. Mr McIntosh stated that the only real difference between the proposed 2 x 1 configuration and the approved 1 x 1 configuration is that a smaller steam turbine would be installed<sup>283</sup>.
520. By contrast, Mr Walton stated that an “awful lot” of plant would have to be redesigned as a result of the reduction in capacity, being everything in the process train following the heat recovery steam generator<sup>284</sup>. However, as Mr Walton is a lay witness and does not have an engineering background, he cannot provide an authoritative statement on the extent of plant redesign that would be required and, given his interest in obtaining approval for a 600MW plant (not being a disassociated independent witness), he appears to be overstating the impact.

### *Project configuration*

521. There were differing views on whether a 2 x 1 configuration is superior to a 1 x 1 configuration for gas turbine combined cycle power generation.
522. Mr Walton’s initial opinion that a 2 x 1 configuration is the “generally accepted most beneficial application of gas turbine combined cycle generation”<sup>285</sup> was disputed by Mr McIntosh in his expert evidence.
523. Mr McIntosh considers that the 1x1 configuration has a number of advantages over a 2 x 1 configuration, being that it:
- (a) is simpler;
  - (b) has better part-load performance than a 2x1 configuration (ie. when running at less than full capacity);
  - (c) has a higher reliability as each gas turbine has its independent own steam turbine; and
  - (d) is smaller.<sup>286</sup>
524. Further, Mr McIntosh highlighted that 1 x 1 is the preferred configuration of many gas turbine manufacturers worldwide, including GE<sup>287</sup>.
525. When asked to comment on Mr McIntosh’s opinion that there is greater operational flexibility with 2 single shaft CCGTs (ie 2 trains each in a 1 x 1 configuration), than

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<sup>283</sup> McIntosh, examination, P1039 L16-P1040 L13 and P1041 L31-P1042 L5

<sup>284</sup> Walton, examination, P1236 L18-P1237 L17

<sup>285</sup> Walton, witness statement, DGA.200.115 at DGA.200.120

<sup>286</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.497-498 (paragraphs 10-12); McIntosh, examination, P1039 L29-1041 L13

<sup>287</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.497; McIntosh, examination, P1039 L2

offered by Dual Gas's proposed 2 x 1 option, Mr Walton unambiguously agreed. He stated

I would fully agree with him that two one plus one configurations has much greater flexibility, much greater operational and will secure all the point end activities and value that I established before. So yes, I fully support that two single shafts, one to one gas turbine and a steam turbine is the best configuration and gives you the ultimate operational configuration, yes.<sup>288</sup>

526. Mr Tsesmelis agreed that an IGCC plant in a 2 x 1 configuration is a "template" that has emerged in the US and there are commercial advantages in demonstrating a plant that meets this "template"<sup>289</sup>. However, he also highlighted that there are a number of IGCC plants in operation around the world that are a 1 x 1 configuration and are a similar commercial size to the approved 300MW plant<sup>290</sup>. He confirmed that at least 7 of the 14 IGCC plants listed in Table 2 of his expert witness statement are in a 1 x 1 configuration<sup>291</sup>.
527. Although Mr Walton has claimed that the operational and maintenance impacts of the reduction in capacity to 300MW are "very significant", he acknowledged that he is not qualified to quantify the absolute costs of these impacts<sup>292</sup>. Therefore, this claim has not been substantiated and the Tribunal should give it no weight.
528. Further, Mr Walton admitted that a 1 x 1 configuration would not result in increased outage time for maintenance compared to a 2 x 1 configuration<sup>293</sup>.
529. The EPA submits that the fact that many 1x1 configuration plants are in operation suggests that any operational and maintenance disadvantages compared to a 2 x 1 configuration are not significant enough to influence the viability of such projects<sup>294</sup>.
530. Also, Mr Walton claimed that a 2 x 1 configuration mitigates "construction and manufacturing risks", particularly the risk that a turbine may be damaged in transit or defective, because the two turbines would be constructed and transported separately<sup>295</sup>. Mr Walton did not quantify this risk either in terms of likelihood or cost. The EPA submits that this claim is highly speculative and should be given no weight.
531. In conclusion, the EPA submits that requiring Dual Gas to adopt a 1 x 1 configuration is not unreasonable and, in fact, Mr Walton has conceded that a 1 x 1 configuration is the "ultimate operational configuration".

<sup>288</sup> Walton, cross-examination, P1408 L15-21

<sup>289</sup> Tsesmelis, cross examination, P988 L8-13

<sup>290</sup> Tsesmelis, examination, P947 L4-8; Tsesmelis, cross-examination, P984 L5-P985 L8

<sup>291</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.017 (as updated on 8 November 2011: see Tsesmelis, cross-examination, P983 L19-31)

<sup>292</sup> Walton, examination, P1254 L16-28

<sup>293</sup> Walton, examination, P1252 L19-29

<sup>294</sup> McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.498 (paragraph 11)

<sup>295</sup> Walton, examination, P1253 L26-P1254 L15

### ***Changes in the efficiency of the steam turbine***

532. It is common ground that a smaller steam turbine for a 300MW plant will be approximately 0.3% (in percentage points) less efficient than the larger turbine that was proposed for the 600MW plant.
533. In Mr McIntosh's expert opinion, the reduction in efficiency is marginal<sup>296</sup>.
534. Although a 0.3% reduction in efficiency will impact the GEI of the DGDP, in Mr McIntosh's opinion, it will only impact the GEI by approximately a third of that reduction as the steam turbine typically only provides a third of the power output of a CCGT<sup>297</sup>.
535. Mr Walton states that over the lifetime of the project this difference in efficiency would add up to a "significant" amount of extra fuel<sup>298</sup>, however he fails to quantify what this amount would be. Accordingly the EPA submits that the Tribunal has no evidence to support Mr Walton's assertion, particularly given his status as a lay witness.
536. Further the EPA submits that even though a larger steam turbine would be marginally more efficient, it is important to note that Dual Gas was proposing to operate the steam turbine at less than full capacity during Stage 1 in any event.
537. By proposing to operate GT2 for only 30% of the year<sup>299</sup> during Stage 1 Dual Gas is proposing to run a steam turbine designed for up to 275 MW at half capacity or less for 70% of the year. Mr Blatchford has agreed that this would result in the steam turbine running "sub-optimally"<sup>300</sup> in any case.

### ***Practicality of incorporating an F class gas turbine in Stage 2***

538. One of the reasons that the EPA refused to approve Stage 2 at this time was that, by the time Stage 2 is to be constructed (if ever), it is likely that an F class gas turbine will be available for operation on the syngas from the DGDP.
539. Mr Walton has claimed that having one E class gas turbine and one F class turbine on the proposed DGDP site (rather than two E class gas turbines) would give rise to certain economic and logistical issues.
540. In particular, Dual Gas would need to have separate operations and maintenance regimes<sup>301</sup> and it would lose the benefit of sharing spare parts<sup>302</sup> (although Mr Walton

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<sup>296</sup> This is particularly so when compared with the inefficiency introduced by steam injection for NO<sub>x</sub> control when operated on natural gas: see McIntosh, expert witness statement by way of reply, EPA.100.496 at EPA.100.498 (paragraph 12);

<sup>297</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.400-R (paragraph 62)

<sup>298</sup> Walton, examination, P1264 L13-16

<sup>299</sup> Blatchford, examination, P727 L25-30

<sup>300</sup> Blatchford, cross-examination, P913 L31-P914 L16

<sup>301</sup> Walton, examination, P1259 L29-P1260 L12

<sup>302</sup> Walton, examination, P1248 L8-15

has conceded that the maintenance advantages of having two E class turbines on-site are mainly economic and that there would be no difference in outage time<sup>303</sup>).

541. Also, Mr Walton highlighted that F class gas turbines are a different size with effect that the proposed second integrated drying and gasification unit (**IDG2**) would have to be a different size “and so any design or enhancements or work that was in the first gasifier, would not have any value on the second gasifier. It would have to be completely redesigned for the gasifier to now meet an F class turbine”<sup>304</sup>. This statement suggests that Dual Gas is proposing to demonstrate HRL’s IDG technology at a capacity that will shortly become redundant as F class syngas capable gas turbines become more widely available.
542. The EPA acknowledges that if an F class gas turbine that can operate on syngas from the DGDP becomes available before Stage 2 and Dual Gas is required to incorporate it into its second train (if approved), it may be less convenient for Dual Gas than having two E class gas turbines. However, the EPA considers that this is the generally accepted consequence of technological improvements and does not justify a claim by a polluter that it should be entitled to continue to use outmoded technology that generates more emissions than modern alternatives.
543. Also, the EPA notes Mr Tsesmelis’s opinion that successful demonstration of the DGDP with both E class and F class turbines will increase the potential sales value of the IDGCC technology<sup>305</sup>.

### ***Conclusion***

544. The EPA submits that it is reasonably possible for Dual Gas to redesign the DGDP to reduce its capacity from 600MW to 300MW and this would not give rise to any overriding or unreasonable technical difficulties or inefficiencies.

## **15.3 Economic Implications**

545. Dual Gas has claimed that reduction in plant capacity to 300MW required by the Works Approval will
- (a) fundamentally and unreasonably affect the economic viability of the plant; and
  - (b) result in an increase in the per unit cost of electricity production.<sup>306</sup>
546. In its response to the EPA’s Request for Further Particulars, Dual Gas stated that the economic viability of the plant is determined by a number of factors, including but not

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<sup>303</sup> Walton, examination, P1252 L19-20

<sup>304</sup> Walton, examination, P1260 L31-P1261 L6

<sup>305</sup> Tsesmelis, cross examination, P1009 L2-12

<sup>306</sup> Dual Gas, Application for Review in P1829/2011, DGA.200.008 at DGA.260.013 (paragraph 5(b)(i) and 5(b)(ii))

limited to initial capital expenditure, operating costs and revenue streams, and that the reduction in plant capacity to 300MW impacts on each of these variables.

547. Mr Blatchford and Mr Walton appeared before the Tribunal in support of these claims.

### ***Witness credibility***

548. Mr Blatchford has been a “company” man for 17 years. He admitted that his credibility within HRL is somewhat tied to the success of the DGDP and that he would be disappointed not to see the DGDP go ahead.<sup>307</sup> He was involved in providing answers to the EPA’s questions prior to its decision to issue the works approval.<sup>308</sup>

549. Mr Blatchford was not involved in the economic evaluations of the project<sup>309</sup>. Accordingly, while he can generally note that there are economies of scale in the 600MW proposal, he has no expertise in the economic implications of reducing the capacity of the project from 600MW to 300MW. In providing such an opinion he was simply repeating the views of others at HRL.

550. Mr Blatchford further admitted that he was not involved in the preparation of portions of his report, which were drafted by others<sup>310</sup> and that he failed to comply with the terms of PNVACT2 regarding expert evidence<sup>311</sup>.

551. The only other evidence lead by Dual Gas on the economics of the project was from Mr Walton. Mr Walton is a contractor who has been contracted to the Project since September 2010. He was put forward as a lay witness rather than an expert and his evidence should be treated with caution as he has no overriding duty to assist the Tribunal and he has not declared that there are no matters of significance which have been withheld from the Tribunal. By confirming that “nothing I have done or said is from the company’s perspective solely”<sup>312</sup>, he conceded that in giving evidence he is, to an extent, a spokesman for Dual Gas.

552. Neither the Tribunal, nor any party or witness in these proceedings other than Mr Walton, is privy to the full costing of the DGDP, despite the fact that confidentiality undertakings have been given by Counsel, instructing solicitors and experts<sup>313</sup>. In these circumstances the Tribunal is faced with a situation where the only witness who has information on the actual cost of the project may be advocating for Dual Gas and also may have withheld information that may be relevant to the Tribunal’s decision.

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<sup>307</sup> Blatchford, cross-examination, P816 L6; Blatchford cross-examination, P773 L14-P774 L11

<sup>308</sup> Blatchford, cross examination, P776 L27-P777 L15

<sup>309</sup> Blatchford, cross-examination P817 L27-P181 L6; Blatchford cross-examination, P779 L5-13

<sup>310</sup> Blatchford, cross-examination, P778 L10-19

<sup>311</sup> Blatchford, cross-examination, P813 L3-P814 L5

<sup>312</sup> Walton, cross-examination, P1393 L8-9

<sup>313</sup> Walton, examination, P1227 L1-7; Walton cross-examination, P1389 L5-10

553. The EPA submits that the Tribunal should only accept Mr Walton's evidence if there is independent corroboration of his statements from other sources, such as other expert witnesses or authoritative publications.
554. In contrast, Dr Washusen comes to the Tribunal as an independent expert, with directly relevant experience advising on the economics of the National Electricity Market (NEM) in Australia. Dr Washusen is a Principal Consultant for a large economics and finance consulting company, Marsden Jacobs Associates, and provides advice in relation to economics, finances, and regulation of the electricity, gas and water industries. Dr Washusen has previously worked with development of strategy for newly privatised utility companies, including electricity companies, and has held positions with the Office of the Regulator General and the Victorian State Electricity Commission.<sup>314</sup>

***Estimated impact of the reduction in capacity on capital expenditure***

555. Dual Gas and the EPA agree that the overall capital cost of the 300MW plant (constructed in accordance with the Works Approval) will be substantially less than the capital cost of the proposed 600MW plant.
556. However, in comparing the capital cost of the proposed 600MW plant to the 300MW plant, Dual Gas submits that the key figure is the unit capital cost, or cost of capacity installed. This figure is calculated by dividing the total capital cost by the capacity in kW, resulting in a figure in \$ per kW. This allows comparison of the capital cost of a unit of electricity generation capacity between plants.
557. The unit capital cost is also used to calculate the per unit cost of electricity production.
558. The EPA accepts that the reduction in capacity to 300MW will result in a higher unit capital cost, but submits that Dual Gas's estimates of this increase are substantially overstated and that the increase will not have an unreasonable impact on the project.

***What is the likely impact of the reduction in capacity on the unit capital cost of the project?***

559. The unit capital cost of a 300MW plant is likely to be more than a 600MW plant because of the loss of certain "economies of scale", for example<sup>315</sup>:
- (a) the use of a smaller steam turbine (which may be comparatively more expensive than a larger turbine);
  - (b) the inability to share components (e.g. blades, vanes and transformers) between the two gas turbines; and

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<sup>314</sup> Washusen, examination, P1301-1302

<sup>315</sup> Walton, examination, P1236 L22-30

- (c) the balance of plant and common equipment between the two gas turbines (eg. the control systems, air cooling and water cooling systems) may need to be re-sized (which may mean it is comparatively more expensive), or it may not be possible to reduce the size of certain plant and equipment (again, making it comparatively more expensive).

560. Mr McIntosh notes that as the majority of equipment for the 300MW and 600MW plants would be the same, the economies of scale for the larger DGDGP are much less than would be found in, for example, traditional steam boiler plants. In particular, the only lost 'economy of scale' between a 300MW plant and a 600MW plant is the requirement to purchase a smaller steam turbine. In both plants, the key component – the gas turbine – remains the same<sup>316</sup>.
561. Mr Walton spent considerable time before the Tribunal explaining how the reduction in capacity to 300MW would affect the operations and maintenance schedule of the DGDGP<sup>317</sup>. However, the only economy of scale he referred to was the inability to share components between two gas turbines, which would mean that the \$30 million cost for a spare set of turbine blades (required for redundancy and scheduled major maintenance)<sup>318</sup> and the \$10 million cost for a spare transformer (required for redundancy)<sup>319</sup> would not be spread over two turbines.
562. Given that the maximum financial impact on operations and maintenance is the lost chance to share a \$40 million cost across two trains, the EPA considers that Mr Walton has overstated this impact on the project (particularly in light of his comment referred to above at paragraph 527 that he is not qualified to quantify the extra cost) and the Tribunal should not take this into account when considering the impact of the reduction in capacity to 300MW.

*Mr Walton's estimate of the unit capital cost increase*

563. Mr Walton has stated that the unit capital cost of a 300MW plant would be 23% greater than for the proposed 600MW plant<sup>320</sup>.
564. Despite the fact that Mr Walton has access to Dual Gas's detailed cost information, his 23% estimate is the result of calculations loosely based on cost estimates for supercritical brown coal and undefined "small" and "medium" CCGT plants from a

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<sup>316</sup> McIntosh, examination, P1041 L19-P1042 L1; McIntosh, expert witness statement, EPA.100.387-R at EPA.100.400-R (paragraph 60)

<sup>317</sup> Walton, examination, P1246-1254

<sup>318</sup> Walton, examination, P1250 L14-16 and P1251 L28-31

<sup>319</sup> Walton, examination, P1253 L9-16

<sup>320</sup> Walton, witness statement, DGA.200.115 at DGA.200.122

- single publicly available report, being *Carbon Pricing and Australia's Electricity Markets* prepared by SKM/MMA in July 2011 (**SKM/MMA 2011 report**)<sup>321</sup>.
565. The only figure in Mr Walton's calculation that is actually based on Dual Gas's own cost information is the capital cost of the IDG unit and its associated plant for the 300MW plant<sup>322</sup>.
566. Also, Mr Walton has confirmed that "nobody has gone out and done an EPC verification or pricing of a 300 megawatt plant"<sup>323</sup>.
567. As a result, the EPA submits that the Tribunal should not give any additional weight to the evidence of Mr Walton on the basis that he has had access to the actual costings of the DGDP, as these were not used to any great extent in preparing his estimates of the increase in unit capital cost.
568. In order to calculate the unit capital cost increase due to the reduction in capacity of the DGDP from 600MW to 300MW, Mr Walton first estimated the unit capital cost of the proposed 600MW project.
569. Although Mr Walton claimed he was not at liberty to divulge Dual Gas's actual cost estimates for the proposed 600MW plant, he stated that the unit capital cost of the DGDP will be "materially less than \$2900/kW", which is the figure provided in the SKM/MMA 2011 report for supercritical brown coal plants<sup>324</sup>. Mr Walton clarified that by "materially less" he means 10% to 30% lower than \$2900/kW<sup>325</sup>. No independent verification of that assertion has been provided to the Tribunal<sup>326</sup>.
570. Mr Walton used the estimated unit capital cost of supercritical brown coal plants (\$2900/kW) as a baseline and multiplied this by the capacity of the 600MW DGDP to work out an estimated gross capital cost for 600MW DGDP of "materially less than \$1,740 million". Using the estimated unit capital cost of "medium" CCGT set out in the SKM/MMA 2011 report (\$1,400/kW) as an indicator of the cost of the gas turbine component of the 600MW DGDP, he calculated that the CCGT for the 600MW plant would cost approximately \$840 million, giving a cost estimate for the remainder of the plant (including the IDG units) of materially less than \$900 million.
571. Mr Walton then used the estimated unit capital cost for "small" CCGT set out in the SKM/MMA 2011 report (\$1850/kW) to work out a gross capital cost for a 300MW CCGT (\$555 million) and used his own knowledge of the cost of the IDG units to estimate a cost for the remainder of the project (materially less than \$515 million). Mr

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<sup>321</sup> Walton, witness statement, DGA.200.115 at DGA.200.121

<sup>322</sup> Walton, examination, P1244 L9-18

<sup>323</sup> Walton, cross-examination, P1388 L6-8

<sup>324</sup> The EPA notes that Mr Walton did not use the higher figure of \$6601/kW for an "IGCC with drying" plant because he claimed that it is different technology: see Walton, cross-examination, P1382 L20-23

<sup>325</sup> Walton, examination P1227 L27; Walton, cross-examination, P1380 L29-P1381 L3

<sup>326</sup> Walton, cross-examination, P1381 L10-13

Walton then added these together to calculate an estimated gross capital cost of \$1,070 million, and a unit capital cost of \$3566/kW, for a 300MW project.

572. On this basis Mr Walton concluded that the increase in unit capital cost for a 300MW project would be 23%, being the percentage increase between \$2900/kW and \$3566/kW.
573. Dr Washusen considers that Mr Walton has used cost figures that are higher than reasonable in the circumstances<sup>327</sup>.
574. In particular, Dr Washusen disputed Mr Walton's use of the cost estimate for "small CCGT in the SKM/MMA 2011 report, highlighting that the SKM/MMA 2011 report does not quantify the actual capacity of "small", "medium" or "large" CCGT plants.
575. Dr Washusen considers that a "small" CCGT in the 2011 SKM/MMA report means a plant of 100MW not 300MW, on the basis that the same scaling methodology and base 500MW "unit" were used in the Worley Parsons report AEMO Cost Data Forecast For the NEM published on 31 January 2011 (**WP 2011 report**)<sup>328</sup>, which referred to 700MW (large), 300MW (medium) and 100MW (small) CCGT plants.
576. Further, as shown in Table 2 of Dr Washusen's reply to Mr Walton's witness statement<sup>329</sup>, Mr Walton has used the highest publicly available estimate of the unit capital cost of a CCGT plant (\$1850/kW, from the SKA/MMA 2011 report) which is before the Tribunal to calculate the unit capital cost of the 300MW DGDP plant.
577. In contrast, the following alternative estimates of the cost of a CCGT plant are provided in public reports, sorted from lowest to highest:

\$1125/kW	WP 2011	700MW CCGT
\$1181/kW	WP 2011	300MW CCGT
\$1224/kW	ROAM 2011	capacity unspecified CCGT
\$1275/kW	ACIL 2009	capacity unspecified CCGT
\$1300/kW	SKA/MMA 2011	"large" CCGT (e.g. 700+MW)
\$1368/kW	ACIL 2010	capacity unspecified CCGT
\$1400/kW	SKA/MMA 2011	"medium" CCGT (e.g. 300MW)
\$1541/kW	WP 2011	100MW CCGT
\$1850/kW	SKA/MMA 2011	"small" CCGT

<sup>327</sup> Washusen, examination, P1338 L7-16

<sup>328</sup> Washusen, examination, P1335 L28-P1336 L11; Washusen, expert witness statement by way of reply, EPA.100.529 at EPA.100.548-553 (paragraph 67)

<sup>329</sup> Washusen, expert witness statement by way of reply, EPA.100.529 at EPA.100.548 (The EPA notes that Dr Washusen's statement contains a typographical error and incorrectly states that 'small' CCGT is \$1830kW, rather than \$1850kW)

578. Using Mr Walton's methodology and Dr Washusen's preferred cost estimates for a 300MW CCGT (being "medium" CCGT from the SKA/MMA Report or a 300MW CCGT plant from the WP 2011 report), provides the following figures:

	<b>300MW CCGT as per WP 2011</b>	<b>medium CCGT as per SKM/MMA 2011</b>	<b>Walton's estimate, based on small CCGT, as per SKM/MMA 2011</b>
Unit capital cost for closed cycle gas turbine	\$1,181/kW	\$1400/kW	\$1850/kW
Gross capital cost of 300MW closed cycle gas turbine plant	\$354 million	\$420 million	\$555 million
Gross capital cost for the whole 300MW DGDP plant (based on \$515 million for IDG and other plant)	\$869 million	\$935 million	\$1,070 million
Unit capital cost of the DGDP	\$2897/kW	\$3,116/kW	\$3566/kW
<b>Percentage increase compared to 600MW project at \$2900/kW</b>	<b>- 0.1%</b>	<b>7%</b>	<b>23%</b>

579. This table illustrates the significant impact that the assumed cost of the CCGT component of a 300MW plant has on the estimated percentage increase in unit capital costs due to the reduction in the capacity of the project.

580. In preparing his expert witness statement Dr Washusen analysed a range of publicly available data from different sources on the likely unit capital cost of the DGDP. In particular, Dr Washusen has undertaken an in depth analysis of the methodology and background behind the unit capital cost figures in the WP 2011 report and the SKM/MMA 2011 report, as well as three other reports by ACIL and ROAM Consulting published between 2009 and 2011<sup>330</sup>.

581. Dr Washusen's key conclusions with respect to the estimated increase in the unit capital cost due to the reduction in capacity were:

- (a) the split of capital costs between the gasification units and the gas turbines is approximately 50/50<sup>331</sup>;

<sup>330</sup> Washusen, expert witness statement by way of reply to Mr Walton, EPA.100.529 at EPA.100.548-554 (paragraph 67)

<sup>331</sup> Washusen, examination, P1324 L26-30

- (b) the publicly available figures for the unit capital cost of the DGDP published by the Commonwealth and Victorian Governments<sup>332</sup> appear to be quite low given that the DGDP is effectively an entire CCGT plant with the IDG units added;
- (c) using the figures quoted by ACIL Tasman and Worley Parsons for a CCGT plant as a base, the unit capital cost of the 600MW DGDP is expected to be in the range of \$2250/kW to \$2736/kW, which is consistent with Mr Walton's estimate of 10-30% less than \$2900/kW;
- (d) the unit capital cost of a 300MW CCGT plant is only marginally more than a 700MW CCGT plant (no more than 5%) according to the WP 2011 and SKA/MMA 2011 reports; and
- (e) on this basis the increase in the unit capital cost of a 300MW plant compared to a 600MW plant is expected to be closer to 5% than Dual Gas's estimate of 23%.<sup>333</sup>

582. Dr Washusen's conclusion that 5% is a more reasonable estimate of the increase in unit capital cost makes a significant difference to the estimated increase in the per unit cost of electricity produced due to the reduction in capacity of the project<sup>334</sup>.

***Estimated impact of the reduction in capacity on the per unit cost of electricity production***

*What is meant by per unit cost of electricity production?*

583. In its application for review, Dual Gas did not define "per unit cost of electricity production". However, during the hearing, it became apparent that Dual Gas and Mr Walton were referring to the long run marginal cost of electricity production. Dr Washusen has used the "levelised cost of electricity produced" (LCoE) as the measure of the long run marginal cost of the DGDP.

584. Dr Washusen and Mr Walton have accepted that any differences between the "unit cost of electricity production" (used by Mr Walton) and the LCoE (used by Dr Washusen) are not material to these proceedings, as both refer to the long run marginal cost<sup>335</sup>. In these submissions, the EPA has adopted Dr Washusen's terminology.

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<sup>332</sup> Washusen, expert witness statement, EPA.100.301 at EPA.100.351-352 (paragraph 183); Australian Government, Department of Resources Energy and Tourism, list of LETDF projects, 30 May 2011, [http://www.ret.gov.au/energy/Documents/energy-programs/REVISED\\_LETDF\\_Funded\\_projects\\_30\\_May\\_2011.pdf](http://www.ret.gov.au/energy/Documents/energy-programs/REVISED_LETDF_Funded_projects_30_May_2011.pdf); Victorian Government, Department of Primary Industries, website, EITS projects, <http://m.dpi.vic.gov.au/energy/science-and-research/etis/projects/hrl>

<sup>333</sup> Washusen, expert witness statement, EPA.100.301 at EPA.100.352 (paragraph 183(d)); Washusen, examination, P1315 L16-P1317 and P1324 L20-26

<sup>334</sup> Washusen, examination, P1336

<sup>335</sup> Walton, examination, P1223 L19-25; Washusen, expert witness statement by way of reply, EPA.100.529 at EPA.100.538 (paragraph 32); Washusen, cross-examination, P1460 L23-26

585. It is important to note that the “per unit cost of electricity production” referred to by Dual Gas is not the short run marginal cost of electricity production (**SRMC**) (as SRMC does not include all of the costs incurred over the life of the plant).
586. Mr Walton has not provided an estimate of the impact of the reduction in capacity of the DGDP on the SRMC.
587. Although Mr Walton gave evidence on the SRMC of the DGDP, that was in the context of the ability of the DGDP to displace alternative forms of generation in the NEM. This point was originally raised by Mr Walton as follows:
- (a) Mr Walton claimed broadly that the DGDP has the potential to displace other scheduled generation, based on its low cost brown coal fuel and reduced carbon intensity, and stated that the expectation was that the DGDP would displace generators that have a combination of high costs (due to fuel type) and relatively high burden to pay the carbon price<sup>336</sup>.
  - (b) Dr Washusen disputed this claim in his reply to Mr Walton’s witness statement, highlighting that the DGDP could not produce electricity at a LCoE of less than the average market price in the NEM, or at a lower LCoE than its competitor technologies such as CCGT<sup>337</sup>, and therefore the DGDP would not be economically viable.
  - (c) Mr Walton responded to Dr Washusen’s comments in his supplementary witness statement and in examination before the Tribunal, to the effect that the DGDP would have a SRMC comparable to existing brown coal plants and lower than CCGT plants, and therefore would be able to secure dispatch of electricity into the NEM even if the LCoE of the DGDP was greater than those technologies<sup>338</sup>.
  - (d) Dr Washusen responded by noting that SRMC is important but not necessarily critical<sup>339</sup>. However because securing dispatch in the NEM is vital, generators will bid a significant portion of their capacity at less than \$0 to ensure it is dispatched<sup>340</sup>. Dr Washusen gave the example of how a CCGT generator may place lower bids than a brown coal generator (despite having a higher SRMC) if it can recover the plant’s LCoE over time<sup>341</sup>.

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<sup>336</sup> Walton, witness statement, DGA.200.115 at DGA.200.128 (section 5.2)

<sup>337</sup> Washusen, expert witness statement by way of reply, EPA.100.529 at EPA.100.540 (paragraphs 36-37)

<sup>338</sup> Walton, further witness statement in response to expert evidence from J Washusen and CM Tsesmelis, at p5; Walton, examination, P1272-1290, specifically P1287 L27-P1289 L8 and P1291 L10-27

<sup>339</sup> Washusen, examination, P1329 L14-27 and P1333 L8-11

<sup>340</sup> Washusen, examination, P1332 L2-28

<sup>341</sup> Washusen, examination, P1333 L26-P1334 L5

*What impact will the reduction in capacity of the DGDP have on the per unit cost of electricity production?*

588. Mr Walton originally stated that the reduction in capacity of the DGDP to 300MW would increase the LCoE of the project by approximately 12-20%<sup>342</sup>.
589. On the basis of his modelling, Dr Washusen concluded that the LCoE of a 300MW DGDP plant built in accordance with WA67043 (including SO<sub>2</sub> and noise reduction) would be between \$4MWh-\$10MWh more than for the proposed 600MW DGDP plant, being an increase of between 6-14%<sup>343</sup>. It is important to note that Dr Washusen has assumed that the existing government subsidies of \$150 million would be reduced by 50% as a result of the reduction in plant capacity to 300MW.
590. Dr Washusen noted that Mr Walton's modelling of the LCoE underestimates the weighted cost of capital for the project, as it does not account for the premium on financing costs which would be imposed because the DGDP is an emerging technology, compared to the predicable technology such as OCGT or CCGT<sup>344</sup>.
591. During the hearing, Mr Walton accepted Dr Washusen's upper estimate of 14% as being the "absolute vital number"<sup>345</sup>.
592. Mr Walton also accepted that the majority of cost increases caused by the loss of economies of scale related to operational and maintenance benefits arising from a 2x1 configuration (e.g. sharing the cost of a single set of spare turbine blades and a single transformer across two turbines) were accounted for within the 14% estimate.<sup>346</sup>
593. Mr Walton's 12-20% estimate of the increase in LCoE was based on his estimate of a 23% increase in the unit capital cost. Further Dual Gas has stated in its Further and Better Particulars that this increase is attributable in the main to the increase in the unit capital cost resulting from the reduction in capacity to 300MW<sup>347</sup>.
594. Given the deficiencies in Mr Walton's calculation of his estimated 23% increase in unit capital costs, the EPA submits that Tribunal should accept the expert evidence of Dr Washusen as providing a more credible estimate of the likely impact on the LCoE of the reduction in capacity to 300MW. Dr Washusen considers that the reduction in capacity would increase LCoE by at most 14%<sup>348</sup>. Further as illustrated in the table below (which uses the figures from Table 7<sup>349</sup> of Dr Washusen's expert witness statement), in the majority of scenarios considered by Dr Washusen, the percentage

<sup>342</sup> Walton, witness statement, DGA.200.115 at DGA.200.118 and DGA.200.121-122

<sup>343</sup> Washusen, expert witness statement, EPA.100.301 at EPA.100.362 (paragraph 216); Washusen, examination, P1352 L26-29 Washusen, cross-examination, P1462 L17-22

<sup>344</sup> Washusen, examination, P1319 L10

<sup>345</sup> Walton, examination, P1246 L11-12

<sup>346</sup> Walton, examination, P1255 L1-7

<sup>347</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.030, (paragraph 3(b))

<sup>348</sup> Washusen, examination, P1353 L3-5

<sup>349</sup> Washusen, expert witness statement, EPA.100.301 at EPA.100.358

increase in LCoE is in the range of 4-8%. Further a 14% increase in LCoE requires a 30% increase in the unit capital cost of the plant resulting from the reduction to 300MW (which is more than estimated by either Dr Washusen (~5%) or Mr Walton (23%)).

	<b>IDGCC DG Proposal</b>	<b>IDGCC EPA Works Approval</b>	<b>Difference</b>	<b>Percentage Increase</b>
<b>Table 7</b>	\$71/MWh	\$75/MWh	\$4/MWh	<b>6%</b>
<b>Carbon \$0/t CO<sub>2</sub></b>	\$50/MWh	\$55/MWh	\$5/MWh	<b>10%</b>
<b>Carbon \$100/t CO<sub>2</sub></b>	\$40/MWh	\$145/MWh	\$5/MWh	<b>4%</b>
<b>2% WACC premium</b>	\$75/MWh	\$80/MWh	\$5/MWh	<b>7%</b>
<b>+25% DGDP Cost</b>	\$77/MWh	\$83/MWh	\$6/MWh	<b>8%</b>
<b>NG \$10/GJ (HHV)</b>	\$81/MWh	\$86/MWh	\$5/MWh	<b>6%</b>
<b>+30% EPA Works Approval</b>	\$73/MWh	\$83/MWh	\$10/MWh	<b>14%</b>

*Impact of other variables on the LCoE*

595. In order to assess the significance of the estimated increase in LCoE due to the reduction in capacity of the DGDP, it is important to consider the increase in the context of other variables that may impact on the LCoE.
596. Dr Washusen and Mr Walton agree that the LCoE of the DGDP in either the 600MW or 300MW configuration is influenced by many variables, including<sup>350</sup>:
- (a) the price of natural gas and coal;
  - (b) the mix of natural gas and coal used in the DGDP;
  - (c) the imposition of a price on carbon emissions;
  - (d) the level of government assistance;
  - (e) the increased unit capital cost from the reduction to 300MW, and other EPA conditions (eg. SO<sub>2</sub> reduction); and
  - (f) the weighted average cost of capital (financing costs).
597. Dr Washusen’s modelling has shown that on plausible variations to these variables, the LCoE for the DGDP may vary between \$50-\$172/MWh<sup>351</sup>. In contrast, the maximum impact from the reduction in capacity is at most 14%, or \$10MWh.
598. In addition, Dr Washusen’s modelling shows that a number of unforeseen events, such as a 2% premium in financing costs due to the DGDP being new technology or a 25%

<sup>350</sup> Washusen, cross-examination, P1494 L27-P1294 L9; Walton, examination, P1221 L13-P1224 L24

<sup>351</sup> Washusen, expert witness report EPA.100.301 at EPA.100.358; Washusen, examination, P1429 L6-22

construction costs blowout, could have a similar impact on the LCoE of the project as the reduction in capacity to 300MW (\$4-\$6 MWh)<sup>352</sup>.

599. If the existing government subsidies of \$150 million are not reduced by 50% as a result of the reduction in plant capacity to 300MW, the LCoE of the 300MW DGDP would be lower than Dr Washusen has estimated<sup>353</sup>. According to Dr Washusen's modelling<sup>354</sup>, if the government subsidies are not reduced the 300MW plant would have at least the same<sup>355</sup> or lower LCoE than the 600MW plant on the basis of a 5% increase in the unit capital cost compared to the 600MW plant<sup>356</sup>.
600. In conclusion, the EPA submits that the increase in LCoE resulting from the reduction in capacity of the DGDP to 300MW (if any) would be comparatively small and would not be material to the economic viability of the project in the light of the other factors which also affect the LCoE.

### ***Estimated impact of the reduction in capacity on revenue streams***

#### *Lost revenue from GT2*

601. Dual Gas proposes to install two gas turbines from the outset and operate one of the turbines (GT2) solely on natural gas during Stage 1<sup>357</sup>. Dual Gas expects that it would only operate GT2 during that period for 30% of the year. Dual Gas has indicated both to the EPA and the Tribunal that this will provide cash flow while IDG1 is being commissioned<sup>358</sup>.
602. Dr Washusen has modelled the economics of installing and operating GT2 (on natural gas) for 30% of the year and determined that the extra income would only just cover the increased financing costs associated with funding the purchase of GT2, which would be in the order of \$16 million per annum<sup>359</sup>.
603. Therefore, the EPA submits that not permitting Dual Gas to install and operate GT2 as part of Stage 1 as it has proposed will not impact on Dual Gas's profit levels.

#### *Impact on Government grants*

604. Mr Walton has confirmed that two Government grants have been committed to the DGDP, being \$100 million from the Commonwealth Government Low Emissions

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<sup>352</sup> Washusen, expert witness report EPA.100.301 at EPA.100.358; Washusen, examination, P1323 L2-29

<sup>353</sup> Washusen, cross-examination, P1464 L11-25

<sup>354</sup> Washusen, re-examination, P1516 L19-21

<sup>355</sup> Washusen, examination, P1352 L30-P1353 L2

<sup>356</sup> Washusen, re-examination, P1516 L23-31

<sup>357</sup> Bellair, cross-examination, P1707 L2-7

<sup>358</sup> Blatchford, examination, P739 L27-31

<sup>359</sup> Washusen, examination, P1354 L7-16

Technology Development Fund (**LETDF**) and \$50 million from the Victorian Government Energy Technology Innovation Strategy (**ETIS**)<sup>360</sup>.

605. Although these grants have been committed they have not yet been paid to Dual Gas and are subject to conditions precedent<sup>361</sup>.
606. It is not clear whether the reduction in capacity of the DGDP to 300MW will have an impact on the existing grants. The full terms of the grants are not currently publicly available and Dual Gas did not provide a copy of them to the Tribunal during the hearing.
607. However, the EPA notes that a redacted copy of the Agreement between the State of Victoria and an unknown party in relation to Victorian Government funding for the Large-Scale Integrated Drying Gasification and Combined Cycle Demonstration Project is publicly available<sup>362</sup>.
608. Mr Walton was unsure whether the existing grants are dependent on the size of the project but confirmed that he was not saying that the grants would not be available if the EPA's decision is confirmed<sup>363</sup>.
609. The EPA notes that in May 2011 a representative of the Commonwealth Department of Resources, Energy and Tourism stated before a Senate Estimates Committee that Dual Gas had until the end of 2011 to meet the conditions precedent on the \$100 million Commonwealth LETDF grant, which include reaching financial close<sup>364</sup>.
610. The EPA is not aware of the current status of the Commonwealth LETDF grant or whether the withdrawal of that grant would have an impact on the Victorian ETIS grant. However, the EPA notes that, under clause 17.1 of the funding agreement with the State of Victoria, the State may withhold, suspend, cancel or terminate any advancements due under the agreement if the Commonwealth withholds, suspends, reduces, ceases or cancels any payments under the Commonwealth agreement.

***Whether the reduction in capacity will fundamentally and unreasonably affect the economic viability of the plant***

611. The DGDP will only be “economically viable” if it can generate enough revenue over its lifetime to recover all of its costs including variable costs, capital costs, and financing costs.<sup>365</sup> Therefore, for the DGDP to be economically viable, Dual Gas must be able to

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<sup>360</sup> Walton, examination, P1295 L2-17

<sup>361</sup> Walton, cross-examination, P1406 L16-24

<sup>362</sup> Agreement between the State of Victoria and [redacted] – Victorian Government funding for the Large-Scale Integrated Drying Gasification and Combined Cycle Project, <http://mps.vic.greens.org.au/system/files/Funding%20Agreement%20ETIS%201%20HRL%20-%20scanned%20version%20for%20release.pdf>

<sup>363</sup> Walton, cross-examination, P1404 L24-P1405 L2

<sup>364</sup> Hansard, Senate Economic Legislation Committee, Estimates, Tuesday 31 May 2011,

<http://www.aph.gov.au/hansard/senate/committee/s80.pdf>, at p14

<sup>365</sup> Washusen, examination, P1305 L14-25

sell electricity in the NEM for an average price (\$/MWh) that is greater than the LCoE (\$/MWh)<sup>366</sup>.

612. Although the SRMC is relevant to economic viability, other factors will also influence economic viability, such as long term ability to service debt and return on capital<sup>367</sup>. Mr Walton conceded that investors and lenders would not be interested in the DGDP if the best it can offer is that it's able to cover its SRMC<sup>368</sup>.
613. Dr Washusen has modelled a range of plausible assumptions for the key variables that affect the LCoE of the DGDP both in his witness statements and before the Tribunal. Dr Washusen concluded that on any reasonable set of assumptions the DGDP could not produce electricity at a LCoE lower than the expected long-term average wholesale market price<sup>369</sup>.
614. Mr Walton has agreed with Dr Washusen that no new base load electricity generation is commercially viable at this point in time, including the DGDP<sup>370</sup>. Further, he confirmed that the DGDP, whether it be 600MW or 300MW, needs funding support to make it commercially viable<sup>371</sup> and that "the grants and any other funding support that is required will make the project commercially viable"<sup>372</sup>.
615. It appears that the two Government grants that have been made to the DGDP to date are not sufficient, as Mr Walton has referred to them as "helping towards [the DGDP's] commercial viability"<sup>373</sup>. This is supported by Dr Washusen's modelling, which indicated that these grants were not large enough to make the 600MW DGDP economically viable.
616. Therefore, Dual Gas is not claiming that the reduction in capacity of the DGDP will turn an economically *viable* project into an economically *unviable* project. Rather, Dual Gas appears to be claiming that the reduction in capacity will make the project *even less viable* and that they will require *even more* government funding to make it viable.
617. Dual Gas has not quantified the expected LCoE of the DGDP at 300MW or led any evidence on the expected impact of the increase in LCoE on the economic viability of the DGDP.
618. Mr Walton's evidence on the potential cost impacts is to the effect that:

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<sup>366</sup> Washusen, expert witness statement, EPA.100.301 at EPA.100.310 (paragraph 31(c))

<sup>367</sup> Walton, cross-examination, P1377 L26-P1378 L1

<sup>368</sup> Walton, cross-examination, P1378 L4-7

<sup>369</sup> Washusen, expert witness report, EPA.100.301 at EPA.100.356-358 (particularly paragraph 198); Washusen, cross-examination, P1449 L23-P1450 L3

<sup>370</sup> Walton, cross-examination, P1403 L23-25

<sup>371</sup> Walton, examination, P1299 L1-3

<sup>372</sup> Walton, cross-examination, P1405 L26-27

<sup>373</sup> Walton, examination, P1299 L4-8

- (a) the unit capital cost will increase from “materially less” than \$2900/kW to “materially less” than \$3566/kW (a 23% increase); and
  - (b) on the basis of undisclosed calculations, this will result in an increase of 12-20% above an unspecified base LCoE for the 600MW project.
619. Dr Washusen disputes Mr Walton’s cost estimates. In particular, he considers that Mr Walton’s calculation of the estimated increase in the unit capital cost is unnecessarily high<sup>374</sup> and that 5% is a more reasonable estimate<sup>375</sup>. Further, in Dr Washusen’s expert opinion, the reduction in the capacity of the DGDP from 600MW to 300MW would increase LCoE by at most 14%, and in the majority of circumstances by between 4-8% (and that in certain circumstances the LCoE for the 300MW plant would actually be lower than the 600MW plant). The EPA submits that Dr Washusen’s estimates are more reliable, given his expertise, experience and independence.
620. Although the reduction in capacity of the DGDP from 600MW to 300MW may increase the LCoE of the project, the EPA submits that this is one of the lesser factors affecting the economic viability of the project. Rather, as shown by Dr Washusen’s evidence<sup>376</sup>, the economic viability of the project will depend to a much larger extent on:
- (a) the carbon price in Australia in the next 30 years;
  - (b) the level of government assistance provided to the DGDP;
  - (c) the price of natural gas and coal within Australia;
  - (d) the price of electricity in the future within the NEM; and
  - (e) the cost of obtaining finance for the project.
621. The reduction in capacity to 300MW may also have beneficial economic impacts on the project. Dr Washusen has highlighted that the reduction in the capacity of the DGDP reduces risk for investors and will make it easier to obtain financing. In Dr Washusen’s opinion, a reason why smaller CCGT plants are being constructed in Australia than elsewhere is that investors are more willing to invest \$1 billion than \$5-6 billion in the Australian electricity market<sup>377</sup>. This is because the uncertainty in the future price of electricity leads investors in electricity generation plants to prefer smaller plants that limit their exposure to risk.
622. Mr Walton has accepted that it will be easier to raise finance for the DGDP at 300MW than at 600MW<sup>378</sup>.

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<sup>374</sup> Refer to paragraph 573 above

<sup>375</sup> Refer to paragraph 582 above

<sup>376</sup> Washusen, expert witness report, EPA.100.354-358; Washusen, cross-examination, P1494 L27-P1495 L9

<sup>377</sup> Washusen, examination, P1340 L3-8

<sup>378</sup> Walton, examination, P1247 L5-7

623. In conclusion, Dual Gas has not substantiated its claim that reducing the capacity of the DGDP will “fundamentally and unreasonably” affect the economic viability of the DGDP.
624. In fact, Mr Walton has confirmed that he is not saying that reducing the capacity of the DGDP from 600MW to 300MW fundamentally challenges the commerciality of the project<sup>379</sup>. When asked directly whether a 300MW plant would be commercially feasible, Mr Walton replied “it’s feasible, but it would change, the economics would change”<sup>380</sup>.
625. The EPA submits that the reduction in capacity to 300MW does not fundamentally or unreasonably affect the economic viability of the plant because:
- (a) the plant at 600MW is not economically viable in the NEM at the present time (without Government grants);
  - (b) the evidence lead by Mr Walton consistently overstates the level of impact of the reduction in capacity on costs compared to other factors;
  - (c) while the plant may be comparatively less viable as a result of the reduction in capacity to 300MW, the reduction in capacity is one of the more minor factors influencing the economic viability of the project;
  - (d) a number of other key factors, such as the cost of fuel and the carbon price, will have an impact on the economic viability of the DGDP that is significantly larger than the reduction in capacity from 600MW to 300MW;
  - (e) the proposed operation of GT2 solely on natural gas during Stage 1 will not generate profit for Dual Gas and therefore the refusal of GT2 will not affect the economic viability of the project; and
  - (f) the reduction in the capacity of the DGDP reduces risk for investors and will make it easier to obtain financing.
626. Further, the EPA submits that, as the reduction in the capacity of the DGDP would only lead to a relatively minor increase in LCoE (if any), the measure is an appropriate and proportionate precautionary response to the risk of climate change – an environmental problem of the greatest magnitude.

***Implications for technical and commercial demonstration***

627. Dual Gas has put forward its project as a “demonstration” project. In its Works Approval Application, Dual Gas stated that it “proposes to develop a new power station

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<sup>379</sup> Walton, cross-examination, P1394 L31-P1395 L3

<sup>380</sup> Walton, cross-examination, P1395 L4-8

to generate base load power whilst demonstrating new power generation technology at commercial scale at a site in Morwell, Victoria<sup>381</sup>.

628. Mr Tsesmelis has clarified that what is being demonstrated is the ability of the HRL gasifier technology to provide stable and consistent operation and produce syngas of consistent and reliable quality to feed a combined cycle power plant<sup>382</sup>. He highlighted that

The important point is that HRL are not licensing a power plant. A potential licensor of the HRL coal gasification technology in the future could engage any of the major gas turbine and steam turbine suppliers to integrate a Combined Cycle Power Plant “add-on” to the HRL gasifier.<sup>383</sup>

629. The EPA submits that a reduction in the capacity of the DGDP to a single 300MW “train” (ie. one gasifier and one combined cycle power plant) will not affect Dual Gas’s ability to demonstrate HRL’s gasifier, either technically or commercially.
630. This is supported by both Mr Tsesmelis and Mr McIntosh who gave expert evidence that a single “train” can demonstrate the technical and commercial viability of the HRL gasifier technology.<sup>384</sup> Further, Mr McIntosh’s opinion is that “it is clearly Dual Gas’s intention to test and develop the technology on one train only”<sup>385</sup>.
631. Mr Blatchford conceded that a 300MW plant would be sufficient to demonstrate the technology<sup>386</sup>.
632. Mr Walton has conceded that the technology aspects could be demonstrated in a 300MW plant but has made inconsistent statements during the hearing regarding the ability to prove it on a commercial scale. In examination in chief, he confirmed that “Once the first gasifier has been proven commercially and residual bits of technology as well, then an application will go ahead for a second gasifier”<sup>387</sup> (suggesting that one “train” is sufficient). However, in cross examination he queried whether it would be possible to “fully demonstrate” the commercial aspect with a 300MW plant<sup>388</sup>. The EPA submits that there is no substance to that claim, as Mr Walton agreed that any plants that are up and running are commercially viable<sup>389</sup> and his only response when it was put to him that 9 of the 14 IGCC plants that are currently operating worldwide are 300MW or less was that most of them are connected to refineries so they are not

<sup>381</sup> Dual Gas, Works Approval Application, EPA.020.293 at EPA.020.298 (page 6)

<sup>382</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.027 (paragraph 88)

<sup>383</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.018 (paragraph 59)

<sup>384</sup> McIntosh, examination, P1028 L20-22; McIntosh, expert witness statement EPA.100.387-R at EPA.100.403-R (paragraph 74); Tsesmelis, examination, P948 L3-25; Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.005 (paragraph 1) and EPA.00.027-028 (paragraphs 88-93)

<sup>385</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.392-R (paragraph 16)

<sup>386</sup> Blatchford, cross-examination, P784 L16-19

<sup>387</sup> Walton, examination, P1235 L10-13

<sup>388</sup> Walton, cross-examination, P1398 L2-4

<sup>389</sup> Walton, cross-examination, P1398 L20-25

typical power generation facilities (in fact, only 2 of the 9 are connected to refineries)<sup>390</sup>.

633. In addition, the staging of the project indicates that Dual Gas considers that one “train” is sufficient to demonstrate the technology as Dual Gas would only construct IDG2 if the demonstration of IDG1 is successful (with IDG2 incorporating any lessons learnt from the demonstration of IDG1).
634. It appears from Dual Gas’s response to the EPA’s Request for Further Particulars and questions posed during the hearing, that Dual Gas will argue that the proposed 600MW DGDGP will result in technology that is “even more proven and demonstrated” because it will enable lessons learnt from IDG1 to be put into effect in IDG2<sup>391</sup>. The ability to implement lessons learnt from the first IDG in the second IDG was also highlighted by Mr Blatchford in his evidence<sup>392</sup>.
635. Mr McIntosh disputed this argument. In particular, in his expert opinion, lessons learnt from IDG1 would generally be applied to IDG1<sup>393</sup>. Further, he disagreed that it would be easier to persuade the Chinese or charge them a higher price if the technology was demonstrated with two gasifiers<sup>394</sup>. In his expert opinion, “if this works, people will – and I think the Chinese are probably a very good example of this...to work off a single gasifier that has been demonstrated to work”<sup>395</sup>.
636. Mr Tsesmelis also disagreed that there would be a greater potential to demonstrate the technology with two gasifiers, stating that “once you’ve proven it in the first gasifier, you’ve proven it”<sup>396</sup>.
637. Therefore, the EPA submits that there is no substance to an argument that the 300MW DGDGP, as approved, will not enable Dual Gas to demonstrate HRL’s novel gasifier technology in a combined cycle power plant.

## 15.4 Implications for the capacity in the NEM

638. Dual Gas has claimed that the reduction in capacity of the DGDGP to 300MW would reduce the ability of the DGDGP to redress an anticipated shortfall of electricity generation capacity in the NEM<sup>397</sup>. However, Dual Gas has not clarified what it means by “anticipated shortfall” or provided any evidence to support its claim that the DGDGP is needed to redress any such shortfall.

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<sup>390</sup> Walton, cross-examination, P1399 L21-31 and P1401 L11-18; Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.017

<sup>391</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.035 (paragraph 4(b)); McIntosh, cross-examination, P1060 L22-28

<sup>392</sup> Blatchford, cross-examination, P784 L28-31

<sup>393</sup> McIntosh, cross-examination, P1060 L 28-P1061 L3

<sup>394</sup> McIntosh, cross-examination, P1061 L22-25

<sup>395</sup> McIntosh, cross-examination, P1061 L26-30

<sup>396</sup> Tsesmelis, cross-examination, P987 L9-17

<sup>397</sup> Dual Gas, outline of submissions, DGA.250.001 at DGA.250.025 (paragraph 82)

639. The EPA submits that, based on Dr Washusen’s expert evidence, although there is expected to be a need for a small amount of extra electricity generation capacity in Victoria in the future due to increasing demand<sup>398</sup>, this is very likely to be met by additional wind generation that is scheduled to come on-line in the near future and transmission line upgrades<sup>399</sup>.
640. The EPA also submits that the DGDP is not suited to addressing any future shortfall in electricity generation capacity due to increased demand. In Dr Washusen’s opinion, because only peak demand (not base load demand) is increasing, the main need is for reliable and flexible plant which can respond to very short, very severe fluctuations in demand<sup>400</sup>. In contrast, in Victoria, the constant, 24 hour a day demand for electricity has remained almost constant for the last 10-12 years<sup>401</sup>. Based on Dual Gas’s descriptions of their technology Dr Washusen noted that gasification is a “steady state process” and therefore the DGDP has limited flexibility to respond to the short, severe fluctuations associated with “peak” demand<sup>402</sup>.
641. Dual Gas also claims that the “anticipated shortfall” will be exacerbated if the Federal Government’s CFC Program comes to fruition and existing emissions-intensive power stations are retired<sup>403</sup>.
642. For the reasons discussed above at section 11.4 (paragraphs 235 to 247), the EPA submits that no weight should be given to the possibility that existing emissions-intensive coal-fired power stations in the Latrobe Valley may close under the CFC Program.
643. However, the EPA submits that even if some generation capacity in the Latrobe Valley is retired under the CFC Program, the shortfall will be in “peak” generation capacity not “base” generation capacity, which as outlined above the DGDP cannot address.
644. In Dr Washusen’s expert opinion:
- (a) if Hazelwood is retired there will still be sufficient “base load” generation capacity in Victoria to meet the “base load” demand;<sup>404</sup> and
  - (b) even the full 2000MW of closures contemplated by the CFC Program occurs in Victoria (which is highly unlikely), there will only be a shortfall of 400-700MW of “base load” generation capacity<sup>405</sup>.

<sup>398</sup> In the order of 96MW in 2014-2015 and 214MW in 2016-2017: see Washusen, expert witness report, EPA.100.301 at EPA.100.359 (paragraph 199)

<sup>399</sup> Washusen, expert witness report, EPA.100.301 at EPA.100.342 (paragraph 59); Washusen, examination, P1346 L20-P1347 L15

<sup>400</sup> Washusen, expert witness report, EPA.100.301 at EPA.100.306 (paragraph 11) and EPA.100.339 (paragraph 152); Washusen, examination, P1334 L23-31

<sup>401</sup> Washusen, examination, P1342 L26-30; Washusen, expert witness report, EPA.100.301 at EPA.100.306 (paragraph 12)

<sup>402</sup> Washusen, examination, P1348 L29 to P1349 L26

<sup>403</sup> Dual Gas, outline of submissions, DGA.250.001 at DGA.250.025 (paragraph 82); Dual Gas, opening submissions, P506 L19

<sup>404</sup> Washusen, examination, P1342 L31-P1343 L2

645. This is in accord with the evidence given by Mr Walton who, in discussing the economic impacts of the CFC Program on the NEM, said that “there will never be a shortage, I think there's enough capacity here”<sup>406</sup>.
646. Dr Washusen also advised that if there is any resulting “base load” generation capacity shortfall, AEMO considers that it would be met by CCGT, which can also respond more flexibility than the DGDP to changes to demand<sup>407</sup>. CCGT plants can also help address the shortfall in “peak” generation capacity and supplement growing unscheduled (wind and solar) generation capacity (which the DGDP cannot)<sup>408</sup>.

## 15.5 Summary

647. Dual Gas’s witnesses in relation to these grounds are not independent and the EPA considers their evidence to be partisan. The EPA’s witnesses are genuinely independent and fully accountable to the Tribunal.
648. A key feature of this partisanship is a consistent pattern of inflating costs and overstating difficulties. By way of example:
- (a) Mr Walton’s claim that an “awful lot” of plant re-design is required by the reduction in scale to 300MW, compared with Mr McIntosh’s evidence that the only difference is that a smaller steam turbine would need to be installed;
  - (b) The alleged difficulties of a 1X1 (v. 2X1) configuration, when 1X1 appears to be the industry norm;
  - (c) Mr Walton’s claim that over the lifetime of the project the lesser efficiency of the smaller steam turbine would add up to a “significant” amount of extra fuel, whereas Mr McIntosh describes the loss in efficiency as “marginal”, especially by comparison with the compromised efficiencies elsewhere in the project (e.g. steam injection to remove NOx);
  - (d) Mr Walton’s claims regarding the cost and logistical benefits of an E-class GT2, the absence of which he later conceded was “economic” and would not affect outage times; and
  - (e) Mr Walton’s claims that design enhancements pertaining to GT1 which might arise from the demonstration would have no value if GT2 were F-class, compared with Mr Tsesmelis’s claim that successful demonstration on both an E and F class would increase the value of the technology and mitigate the risk of redundancy as F-class turbines penetrate the market.

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<sup>405</sup> Washusen, cross-examination, P1446 L18

<sup>406</sup> Walton, examination, P1296 L12-21

<sup>407</sup> Washusen, cross-examination, P1447 L25-P1448 L30

<sup>408</sup> Washusen, examination, P1342 L23-26

649. On the balance of this evidence, the EPA submits that the reduction in scale involves only modest re-design and does not give rise to any significant technical or logistical difficulties.
650. The same consistent over-statement is apparent in the economic evidence, as shown by:
- (a) Mr Walton's largely unsubstantiated claims in relation to "economies of scale" affecting the operations and maintenance schedules of the DGDP, with the only disclosed differential being a maximum of \$40m in respect of shared components;
  - (b) Mr Walton's claim of a 23% increase in the unit capital cost, loosely derived from generic cost information from a public source and using the highest publicly available unit capital cost of a CCGT plant, which Dr Washusen (who possesses economics credentials which Mr Walton does not have) says is more likely to be of the order of 5%; and
  - (c) Mr Walton's estimate of a 12-20% increase in the per unit cost of electricity production as against Dr Washusen's estimate of 6-14%.
651. As put by Dr Washusen and conceded by Mr Walton, the reduction in capacity will not fundamentally and unreasonably affect the viability of the project. Further, Mr Walton has conceded that a 300MW plant would be feasible.
652. There is no evidence that government grants will be affected by the reduction in scale, despite various other factors bearing on their continuity. Financing of the 300MW DGDP may, indeed, be easier to secure.
653. Finally, based on Dr Washusen's evidence, there is unlikely to be a significant future shortfall in electricity supply to the NEM and any shortfall is likely to be met by additional wind generation that is already scheduled to come on line.

## 16 Sulfur Dioxide Emissions

### 16.1 Volume of SO<sub>2</sub> emissions

654. In the DGDP, when the syngas is burned in the gas turbines, SO<sub>2</sub> will be formed and emitted with the gas turbine flue gases<sup>409</sup>.
655. There was some debate during the hearing regarding the quantity of SO<sub>2</sub> that would be emitted from the DGDP per year.

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<sup>409</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.029 (paragraph 98)

656. On the basis of information contained in the Works Approval Application, Dr Denison (on behalf of the EPA) calculated that the proposed 600MW plant would add 13 million kilograms of SO<sub>2</sub> per year into the Latrobe Valley Air Quality Control Region air shed<sup>410</sup> (assuming constant operation of the plant over a year).
657. Despite the fact that these figures were included in Dr Denison's expert witness statement (which was served on Dual Gas on 4 October 2011), Dual Gas waited until the 14th day of the hearing (16 November) to introduce new evidence from Mr Blatchford to dispute her calculation. Mr Blatchford stated that the numbers used by Dr Denison in her calculation were worst case and assumed a high sulfur content coal (of about 0.54%db)<sup>411</sup>.
658. Mr Blatchford submitted to the Tribunal new calculations of the "Project Annual Average" and "Project Maximum Annual" quantity of SO<sub>2</sub> emissions from the 600MW plant under each of the three "syngas" operational scenarios presented by Dual Gas in its Greenhouse Gas Assessment (Cases 1-3)<sup>412</sup>.
659. For the "Project Annual Average", Mr Blatchford calculated that the quantity of SO<sub>2</sub> emissions from the 600MW plant (in tonnes per year) for Case 1 would be 5,500 (ie. 5.5 million kg); for Case 2 would be 6,200 (ie. 6.2 million kgs); and for Case 3 would be 5,300 (ie. 5.3 million kgs).
660. For the Project Maximum Annual, he calculated that the quantity of SO<sub>2</sub> emissions from the 600MW plant (in tonnes per year) for Case 1 would be 7,200 (ie. 7.2 million kgs); for Case 2 would be 8,900 (ie. 8.9 million kgs); and for Case 3 would be 6,100 (ie. 6.2 million kgs).
661. Mr Blatchford's calculations were based on the assumption that the coal which would be fed into the plant would have a lower sulfur content than Dual Gas had assumed for the purposes of the air modelling (which is where Dr Denison obtained her figures).
662. However, Mr Blatchford also advised the Tribunal that the SO<sub>2</sub> emission rate that Dual Gas had provided for the air modelling was based on the 95<sup>th</sup> percentile value for the sulfur content of Driffield coal<sup>413</sup>, whereas the SEPP (AQM) requires air modelling to be based on "worst case" estimates of emission rates<sup>414</sup>, Dual Gas had made a judgement that a 95 percentile value was appropriate<sup>415</sup>.

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<sup>410</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.376 (paragraph 44); Denison, examination, P1583 L1-4

<sup>411</sup> Blatchford, updated SO<sub>2</sub> emission rates, 16 November 2011, Exhibit D11

<sup>412</sup> Blatchford, updated SO<sub>2</sub> emission rates, 16 November 2011, Exhibit D11

<sup>413</sup> Blatchford, examination, P1728 L13-14

<sup>414</sup> SEPP (AQM), EPA.050.050 at EPA.050.078 (paragraph 4(a), part B, schedule C)

<sup>415</sup> Blatchford, examination, P1739 L27-28

663. As far as Mr Blatchford was aware, the EPA had not been consulted or advised of Dual Gas's decision not to include the highest 5% sulfur content values in its calculation of the emission rate.
664. Mr Blatchford conceded that "there will be a significant peak at the end with the last 5%"<sup>416</sup> and agreed that if the 100<sup>th</sup> percentile value had been used to calculate the emission rate, rather than the 95<sup>th</sup> percentile value, the results of the SO<sub>2</sub> modelling would have been higher<sup>417</sup>.

## **16.2 Application of SEPP (AQM)**

665. The EPA considers that the key aspects of SEPP (AQM) with respect to the SO<sub>2</sub> emissions from the DGDP are the requirement on Dual Gas to apply best practice (clause 19(1)), the requirement on the EPA to apply the principle of integration of economic, social and environmental considerations (clauses 7(1) and 13(1)), and the requirement on Dual Gas to comply with the design criteria (Schedule A). In addition, the EPA has power to require reductions in emissions to a greater extent than required by best practice (clause 30).
666. As outlined earlier in these submissions, the EPA submits that the requirement to apply best practice to the management of emissions is separate from and additional to the requirement to meet the design criteria in Schedule A of SEPP (AQM). This is because the design criteria are the result of a point-in-time assessment of acceptable risk and do not indicate that all health risk is eliminated. As health effects at some level are likely to occur below the criteria, SEPP (AQM) also requires emitters to minimise emissions by the application of best practice<sup>418</sup>.

### ***Best Practice***

667. As previously outlined, best practice requires the adoption of the best combination of eco-efficient 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.
668. The EPA submits that, in order to comply with its obligation to apply best practice to the management of the SO<sub>2</sub> emissions from the DGDP, Dual Gas should be required to install SO<sub>2</sub> reduction equipment.
669. This is so because:

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<sup>416</sup> Blatchford, cross-examination, P1746 L26-27

<sup>417</sup> Blatchford, cross-examination, P1743 L5-6

<sup>418</sup> Denison, examination, P1577 L11-25

- (a) SO<sub>2</sub> reduction equipment is commonly available. This is evident from the wide range of SO<sub>2</sub> reduction options that have been identified by Mr Tsesmelis<sup>419</sup>.
- (b) SO<sub>2</sub> reduction equipment is required and widely used in new fossil fuel power plants in Europe and the United States<sup>420</sup>, where the requirement is for SO<sub>2</sub> reduction of 95% with a maximum emission limit of 400 mg/Nm<sup>3</sup> and for SO<sub>2</sub> reduction of 95% with a maximum limit of 1.4 lbs SO<sub>2</sub> per MWh gross energy output (respectively)<sup>421</sup>. Also, the absorption and removal of H<sub>2</sub>S (and hence SO<sub>2</sub>) and/or CO<sub>2</sub> is a widely and commonly employed process in the gas processing, refining, petrochemical, coal-to-liquids and chemical industries<sup>422</sup>.
- (c) SO<sub>2</sub> reduction equipment demonstrably minimises the emissions from and environmental impact of SO<sub>2</sub> emissions.

### *Eco-efficiency*

670. The question is whether the measure is “eco-efficient”.
671. Dual Gas and the EPA agree that incorporating SO<sub>2</sub> reduction equipment into the DGDP is feasible<sup>423</sup>. Therefore, there are no technical or logistical reasons why such equipment should not be required. Further, the EPA submits that the cost of SO<sub>2</sub> reduction is not material in the context of the project as a whole. This is discussed in more detail below in the context of Dual Gas’s grounds of review.
672. In this case, Dr Denison has calculated that the SO<sub>2</sub> emissions from the approved 300MW DGDP (using SO<sub>2</sub> reduction equipment that will reduce the emissions by at least 90% of uncontrolled emissions) would be 1.3 million kilograms per year<sup>424</sup> compared with 13 million kilograms per year for the proposed 600MW plant. Dr Denison considers that this is “a significant reduction in an air shed that’s already full of this pollutant”<sup>425</sup>. Dr Denison has calculated that the SO<sub>2</sub> emissions from the approved 300MW DGDP (without SO<sub>2</sub> reduction) would be approximately 6.5 million kilograms per year (ie half of the estimated emissions for the 600MW plant).
673. Dr Ross’s modelling predicts that, at the point of maximum impact from DGDP sources, a 600MW plant would increase ground level concentrations of SO<sub>2</sub> from 0.204 mg/m<sup>3</sup> to 0.255 mg/m<sup>3</sup>, a 300MW plant would increase ground level concentrations of SO<sub>2</sub> to

<sup>419</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.030-036

<sup>420</sup> Tsesmelis, expert witness statement by way of reply, EPA.100.507 at EPA.100.512 (paragraph 33)

<sup>421</sup> EPA Assessment Report for WA67043, EPA.010.108-R at EPA.010.132-R (as corrected see: EPA, general discussion, P922 L10-P923 L3)

<sup>422</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.030 (paragraph 105)

<sup>423</sup> Blatchford, witness statement by way of reply, DGA.200.216 at DGA.200.219

<sup>424</sup> Denison, examination, P1583 L11-12

<sup>425</sup> Denison, examination, P1583 L12-13

0.220 mg/m<sup>3</sup> and a 300MW plant with SO<sub>2</sub> reduction would not change ground level concentrations of SO<sub>2</sub><sup>426</sup>.

674. In Dr Denison's expert opinion, based on the health evidence, at the point of maximum impact, the 600MW plant "could or would potentially lead to significant health effects in the exposed populations, and in particular the sensitive groups within that population"<sup>427</sup>. Dr Denison stated that "Given this, any reduction in SO<sub>2</sub> emissions would reduce these potential health impacts and the health burden on that community"<sup>428</sup>.
675. The EPA submits that the health benefits for the Latrobe Valley community (and the associated reduction in costs to the economy) outweigh the cost to Dual Gas of incorporating SO<sub>2</sub> reduction equipment into the DGDP.

### ***Design criterion***

676. The design criterion for SO<sub>2</sub> in Schedule A of SEPP (AQM) is 0.17 ppm (0.45 mg/m<sup>3</sup>).
677. Dr Ross's modelling indicates that the SO<sub>2</sub> emissions from the proposed DGDP (600MW or 300MW) would exceed the design criterion in an area within the Loy Yang power station (where the predicted 99.9 percentile 1-hour average ground level concentration is 0.49 mg/m<sup>3</sup>)<sup>429</sup>.
678. The EPA accepts that the magnitude of the non-compliance at that location is small, is localised spatially and is as a result of existing sources, with the proposed DGDP making only an insignificant increase at that location<sup>430</sup>.
679. The air quality objectives in SEPP (AAQ) on which the design criteria in SEPP (AQM) are based, were based on the AAQ NEPM issued in 1998.
680. Dr Denison gave evidence that there is now a greater understanding of the health evidence than there was in 1998<sup>431</sup>, and that this has led to both the World Health Organisation (WHO) and the US EPA lowering their air quality standards for SO<sub>2</sub><sup>432</sup> (the WHO by a factor of approximately six and the US EPA by 25%).
681. Dr Denison highlighted that, in Australia, the AAQ NEPM has recently been reviewed by the National Environment Protection Council (NEPC) and recommendations have been made to NEPC Ministers that the current standards in the NEPM should be changed to reflect the current understanding of the health effects of the relevant

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<sup>426</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.211-214

<sup>427</sup> Denison, examination, P1583 L27-31

<sup>428</sup> Denison, examination, P1584 L1-5

<sup>429</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.120-121 (paragraphs 53-54)

<sup>430</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.108-109 (paragraph 28); Denison, examination, P1583 L14-20; Denison, cross-examination, P1638 L14-15

<sup>431</sup> Denison, cross-examination, P1602 L27-P1603 L3

<sup>432</sup> Denison, examination, P1580 L6-17

pollutants, including SO<sub>2</sub><sup>433</sup>. A review report which recommended that the SO<sub>2</sub> standards be tightened (ie lowered) was submitted to COAG Ministers on 16 September 2011. The report has been accepted and the process to revise the standards is currently underway.<sup>434</sup>

682. As such, it is a seriously entertained proposal and weight should be given to it.
683. Apart from this, the EPA submits that the greater understanding, and international recognition, of the health impacts associated with SO<sub>2</sub> is relevant to an assessment of whether SO<sub>2</sub> reduction is, in accordance with the precautionary principle, in proportion to the significance of the health issues being addressed.

***Power to require further reductions in emissions***

684. Even if the Tribunal were not to accept that the installation of SO<sub>2</sub> reduction equipment is required under clause 19(1) of SEPP (AQM), the EPA submits that the installation of such equipment can be required under clause 30 of SEPP (AQM).
685. Clause 30 allows the EPA to require Dual Gas to reduce its SO<sub>2</sub> emissions to a greater extent than required by clause 19 of SEPP (AQM) for the purpose of improving or maintaining regional air quality within an Air Quality Control Region (AQCR). As the proposed DGDP is located in the Latrobe Valley Air Quality Control Region<sup>435</sup>, clause 30 applies.
686. Dr Denison gave evidence that, according to the 2009/10 National Pollutant Inventory data, 110 million kg/yr of SO<sub>2</sub> is emitted into the Latrobe Valley Air Quality Control Region (the total amount of SO<sub>2</sub> emitted in Victoria is 210 million kg/yr)<sup>436</sup>. Dr Denison considers that this is a disproportionate load on a population that is particularly vulnerable<sup>437</sup>. Further, in Dr Denison's opinion, it can be considered that the Latrobe Valley airshed is "full" in respect of SO<sub>2</sub><sup>438</sup>.
687. The Department of Health agrees. In its capacity as a referral authority, it has advised that "although the air modelling for SO<sub>2</sub> emissions arising from the Dual Gas proposal generally comply with the 1 hour design criteria in areas of sensitive use, this modelling highlights that the local air-shed appears to be approaching "a ceiling" for this pollutant"<sup>439</sup>.

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<sup>433</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.375 (paragraph 34)

<sup>434</sup> Denison, examination, P1580 L25-29

<sup>435</sup> Denison, examination, P1586 L18-21

<sup>436</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.376 (paragraph 43)

<sup>437</sup> Denison, examination, P1582 L29-31

<sup>438</sup> Denison, expert witness statement by way of reply, EPA.100.556 at EPA.100.561 (paragraph 44)

<sup>439</sup> Department of Health, letter to the EPA re: WA67043, 29 April 2011, EPA.020.264 at EPA.020.265

688. The Department of Health went on to recommend that “specific reference be made to Clauses 30 and 31 of the SEPP (AQM) in the overall assessment of this new proposal by EPA Victoria”<sup>440</sup>.
689. Although, as set out above, the SO<sub>2</sub> emissions from the proposed 600MW plant would cause only a marginal increase at the location where the SO<sub>2</sub> design criterion is currently being exceeded, it will significantly increase SO<sub>2</sub> levels in an area to the north-east of the proposed plant and it will also increase SO<sub>2</sub> levels at the air modelling discrete receptors.
690. If SO<sub>2</sub> reduction is applied, Dr Ross’s modelling predicts that, at the point of maximum impact from DPDG sources, a 300MW plant would not increase existing ground level concentrations of SO<sub>2</sub><sup>441</sup> and at the discrete receptors concentrations would either not change or would only very marginally increase.<sup>442</sup>
691. If regional air quality within the Latrobe Valley Air Quality Control Region is to be maintained (let alone improved), Dual Gas should be required to install SO<sub>2</sub> reduction equipment.
692. The Department of Health comments to the EPA also recommended that the EPA consider utilising clause 31 of SEPP (AQM) to develop an Air Quality Improvement Plan (AQIP) for the Latrobe Valley AQCR. The EPA has commenced the development of the AQIP<sup>443</sup>, which will be completed in mid – end 2013<sup>444</sup>.

### **16.3 Section 20C(3A) of the EP Act**

693. Condition 3.1 (a) was imposed on the Works Approval in accordance with sections 19B(7) and 21(1)(a), (b) and/or (f) of the EP Act. As set out above, the Tribunal also has the power to impose condition 3.1(a) under either clause 19(1) or clause 30 of SEPP (AQM).
694. As a further alternative, section 20C(3A) of the EP Act provides that the EPA (and therefore the Tribunal) may impose conditions in relation to a works approval that “require the observance of standards that are more stringent than would be required by the applicable policy” if it is satisfied that the pollution control technology required to achieve more stringent standards “is commonly available in the industry”.
695. As outlined earlier in these submissions, SO<sub>2</sub> reduction equipment is commonly available and is required and widely used in fossil fuel power plants overseas.

<sup>440</sup> Department of Health, letter to the EPA re: WA67043, 29 April 2011, EPA.020.264 at EPA.020.265

<sup>441</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.211-214

<sup>442</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.199

<sup>443</sup> Denison, expert witness statement by way of reply, EPA.100.556 at EPA.100.559 (paragraph 21)

<sup>444</sup> Denison, cross-examination, P1619 L19-24

696. It is submitted that this discretion should be exercised in the event that the Tribunal considers itself unable to take the views of the Health Department formally into account.

## **16.4 Whether the SO<sub>2</sub> condition is required for CCS-readiness**

697. The Tribunal has queried whether SO<sub>2</sub> reduction equipment (as required by condition 3.1(a)) is necessary in order for the DGDP to be CCS-ready<sup>445</sup>.

698. One of the essential requirements of the globally recognised definition of CCS-ready is that the plant is technically capable of being fully retrofitted for CO<sub>2</sub> capture<sup>446</sup>. As long as the DGDP is technically capable of being fully retro-fitted with CO<sub>2</sub> capture equipment (which necessarily includes sulfur capture), that essential requirement will be satisfied.

699. Therefore, installing sulfur capture equipment prior to the installation of carbon capture equipment is not a requirement of CCS-readiness.

## **16.5 Overview of Grounds of Review**

### ***Dual Gas***

700. Dual Gas is seeking review of condition 3.1(a) on the following grounds<sup>447</sup>:

- the works are expected to operate with 45% lower sulfur dioxide emissions per MWh than any brown coal fuelled power plant in the Latrobe Valley;
- if the works operate on natural gas only, the sulfur dioxide emissions are close to zero;
- the SO<sub>2</sub> emissions reduction levels required by the condition are the highest specified in Australia for a brown coal fired power plant;
- the condition would require additional works that are not the subject of the works approval application;
- the capital and operating cost of the additional works will increase the per unit cost of electricity production;
- the additional power usage due to a sulfur capture plant will result in an increase in CO<sub>2</sub> emissions;
- the condition does not advance the principles of environment protection;
- the condition is not required by any relevant SEPP; and

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<sup>445</sup> DP Dwyer, general discussion, P1760, L18-30

<sup>446</sup> See section 11.3, paragraphs 226-229

<sup>447</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraph 7)

- the condition is unreasonable.

701. Also, Dual Gas has objected to parts of Dr Denison's evidence.

### **DEA**

702. DEA is seeking orders that the Works Approval be set aside on various grounds<sup>448</sup>, including that:

- (a) the proposed works do not apply best practice to the management of its SO<sub>2</sub> emissions;
- (b) the precautionary principle has not been properly applied to the assessment of health impacts of SO<sub>2</sub>; and
- (c) the modelling of the SO<sub>2</sub> emissions is inadequate (on the basis that modelling has not been conducted over 24 hour average or annual average periods) (DEA accepts that this modelling has now been undertaken and has withdrawn this ground of review<sup>449</sup>).

703. Alternatively, if the Tribunal declines to set aside the Works Approval, DEA submits that condition 3.1(a) ought to be retained<sup>450</sup>.

## **16.6 Dual Gas's objection to Dr Denison's evidence**

704. Counsel for Dual Gas has objected to the parts of Dr Denison's evidence that relate to "health impacts of concentrations that are less than the design criteria in the SEPP"<sup>451</sup>.

705. Counsel for Dual Gas stated that<sup>452</sup>:

...our case is that the determination of the matter turns on consistency or inconsistency with State Environment Protection Policy. And if, for example, with sulfur dioxide, it's found that the Dual Gas proposal is not inconsistent with State Environment Protection Policy, we would submit that's the end of the matter.

706. Counsel for Dual Gas went on to say that evidence of health impacts associated with emissions below the design criteria is "of no legal consequence"<sup>453</sup>, and in this regard sought to rely on the decision of Cavanough J in *Thirteenth Beach*.

707. The EPA takes a larger view of compliance with the SEPP (AQM), which includes the requirement of best practice and the discretion afforded by clause 30. If the design criterion said all, these additional clauses would be redundant. As a matter of statutory

<sup>448</sup> DEA, Further Particulars - Statement of Grounds, DEA.460.014 at DEA.460.014-015

<sup>449</sup> DEA, opening submissions, P603 L17-20

<sup>450</sup> DEA, Outline of Submissions, DEA.450.001 at DEA.450.002

<sup>451</sup> Denison, cross-examination, P1570 L15-19

<sup>452</sup> Denison, cross-examination, P1571 L1-6

<sup>453</sup> Denison, cross-examination, P1571 L7-12

interpretation, a construction of the SEPP (AQM) which gives effect to all clauses is to be preferred to one which does not.

708. In addition, as noted above section 20C(3A) of the EP Act expressly allows the decision maker to impose a condition on a works approval requiring the observance of standards that are more stringent than required under the applicable SEPP.
709. The EPA submits that Dr Denison's evidence is of legal consequence for two elements of SEPP (AQM). Firstly, it identifies an "environmental impact" which can be demonstrably minimised by the application of best practice. Secondly, quantification of this impact is an essential aspect of the application of the principle of integration.
710. The EPA also disagrees that the comments of Cavanough J in the *Thirteenth Beach* case support Dual Gas's objection. The passage cited by Counsel for Dual Gas formed part of Cavanough J's reasons for finding that "interest", as that term is used in section 33B(2)(a), has a narrow meaning and has been taken out of context.
711. In *Thirteenth Beach*, no question of law was raised in relation to section 33B(2)(b) or any of the grounds of review under that section involving consistency with the relevant SEPP/WMP. The decision should be distinguished on this basis.
712. To the extent that Cavanough J did comment on the grounds in section 33B(2)(b) (in obiter), his Honour acknowledged that consistency with an Order would depend on the way a relevant Order was framed<sup>454</sup>. This is not inconsistent with the position advanced by the EPA. Dr Denison's evidence is relevant to the application of best practice and the principle of integration, which are integral to the Order (ie SEPP).

## **16.7 Weight to be given to materials presented by DEA**

713. DEA did not lead any evidence at the hearing or cross-examine any of the other parties' witnesses in respect of the potential health effects of SO<sub>2</sub> emissions.
714. As in the case of GHG emissions, it responded to the EPA's request for Further Particulars by referencing a number of reports and studies and also attached a large number of reports and studies to its Outline of Submissions<sup>455</sup>.
715. The EPA submits that any evidence placed before the Tribunal in this manner must be given substantially less weight than that of the expert witnesses, as the other parties have not had the opportunity to test this evidence before the Tribunal.

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<sup>454</sup> In particular, his Honour described it as conceivable "... that a relevant Order is expressed in such a way that a mere risk of discharges, emissions etc "will" involve inconsistency with the Order": see *Thirteenth Beach Coast Watch Inc v The Environment Protection Authority & Anor* [2009] VSC 53 at [40]

<sup>455</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.043-049

716. As Dr Denison was not cross-examined by DEA, the EPA submits that, if there is any inconsistency between the materials provided by DEA and Dr Denison's expert evidence, the Tribunal should rely on Dr Denison's evidence.

## **16.8 Common ground**

### ***Sulfur content of coal***

717. The EPA accepts that Morwell and Yallourn North coal is a low sulfur coal by international standards<sup>456</sup>.

### ***Sulfur Reduction Equipment***

718. Mr Tsesmelis and Mr Blatchford agree that it would be feasible for Dual Gas to install sulfur reduction equipment comprising a Selexol process (for H<sub>2</sub>S absorption from the syngas) combined with a Claus unit (for conversion of the H<sub>2</sub>S to elemental sulfur)<sup>457</sup>.

719. Further, Mr Tsesmelis and Mr Blatchford agree that a two stage Selexol process could be employed, with H<sub>2</sub>S removed in the first stage and CO<sub>2</sub> removed in the second stage (which could be installed at a later date)<sup>458</sup>. It appears that Dual Gas is not relying on Dr Bellair's evidence that SO<sub>2</sub> reduction equipment would become redundant if CO<sub>2</sub> capture is implemented at the plant<sup>459</sup> (which Dr Bellair confirmed was based on verbal advice that he received from Dual Gas<sup>460</sup>).

720. Dual Gas has not disputed Mr Tsesmelis's evidence that it is possible to have the "tie-ins" ready for future installation of the 2<sup>nd</sup> Selexol stage, which would be a "bolt on" to the first stage<sup>461</sup>.

### ***Current levels of SO<sub>2</sub> in the Latrobe Valley***

721. The EPA and Dual Gas agree that:

- the results of the monitoring undertaken by the EPA show that in general the SO<sub>2</sub> levels meet the current air quality standards in SEPP (AAQ) with only occasional exceedances of the 1-hour standard<sup>462</sup>; and
- the monitoring conducted by the electricity generators network shows that there are exceedances of the SO<sub>2</sub> standards in SEPP (AAQ) in particular at Jeeralang Hill<sup>463</sup>.

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<sup>456</sup> Tsesmelis, cross-examination, P989 L31

<sup>457</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.219

<sup>458</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.219; Tsesmelis, examination, P958 L12-17

<sup>459</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047

<sup>460</sup> Bellair, cross-examination, P1707 L22-31

<sup>461</sup> Tsesmelis, examination, P958 L21-25

<sup>462</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.375 (paragraph 37)

<sup>463</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.375 (paragraph 38)

### ***Modelling of impact on SO<sub>2</sub> levels in Latrobe Valley***

722. Dual Gas accepts Dr Ross's modelling of the impact of the SO<sub>2</sub> emissions from the proposed DGGP on ground level concentrations of SO<sub>2</sub> in the vicinity of the plant<sup>464</sup>.

### ***Intervention levels***

723. Dr Bellair agrees with Dr Denison that the Intervention Levels specified in Schedule B of SEPP (AQM) are not relevant to this proposal<sup>465</sup>. Given this concession, the EPA submits that no weight should be given to the references to the Intervention Levels in Dr Bellair's expert witness statement.

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

724. The EPA and DEA agree<sup>466</sup> that:

- ambient levels of SO<sub>2</sub> are associated with increases in mortality (mainly respiratory causes), hospital admissions and emergency department attendances, exacerbation of asthma and reduction in lung function;
- SO<sub>2</sub> has also been linked with low birth weight which is a risk factor for developmental problems;
- children, people with asthma, people with chronic respiratory diseases, the elderly and people with low socio-economic status are particularly vulnerable; and
- epidemiological studies conducted in Australia have shown that the effects observed in international studies are also observed here even though the levels of SO<sub>2</sub> are lower<sup>467</sup>.

725. It is not clear whether Dual Gas accepts the health evidence on SO<sub>2</sub> impacts referred to by Dr Denison and DEA<sup>468</sup>.

## **16.9 Dual Gas's Grounds of Review**

### ***The DGGP's SO<sub>2</sub> emissions are lower than other plants and the reduction levels are the highest in Australia***

726. Dual Gas is seeking review of condition 3.1(a) on the grounds that:

- the works are expected to operate with 45% lower sulfur dioxide emissions per MWh than any brown coal fuelled power plant in the Latrobe Valley; and

<sup>464</sup> Dual Gas, opening submissions, P575 L20-23

<sup>465</sup> Bellair, examination, P1660 L22-23

<sup>466</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.372 (paragraph 12); Denison, examination, P1574 L4-17; DEA, Outline of Submissions, DEA.450.001 at DEA.450.011 (paragraph 41)

<sup>467</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.372 (paragraph 14); Denison, examination, P1576 L4-13; DEA, Outline of Submissions, DEA.450.001 at DEA.450.011 (paragraph 41)

<sup>468</sup> See for example Counsel for Dual Gas's cross-examination of Dr Denison at: Denison, cross-examination, P1571 L7-12

- the SO<sub>2</sub> emissions reduction levels required by the condition are the highest specified in Australia for a brown coal fired power plant<sup>469</sup>.

727. From these grounds, it appears that Dual Gas will contend that SO<sub>2</sub> reduction is not required in order for Dual Gas to comply with its obligation to apply best practice to the management of its SO<sub>2</sub> emissions.

728. In particular, it appears that Dual Gas will contend that best practice should be determined by reference to the current practice of brown coal fuelled power plants in the Latrobe Valley.

729. The EPA submits that determining best practice by reference to techniques, methods, processes or technologies used in coal fired power plants that are around 30 years old<sup>470</sup> is not only contrary to the definition of best practice in the SEPP (AQM) it is also clearly inconsistent with the aim of the SEPP (AQM) to drive continuous improvement in air quality and achieve the cleanest air possible in Victoria<sup>471</sup>.

730. The intention behind the inclusion of this aim in SEPP (AQM) was set out in “Protecting Victoria’s Air Environment – Draft Variation to *State Environment Protection Policy (Air Quality Management)* and *State Environment Protection Policy (Ambient Air Quality)* and Draft Policy Impact Assessment” (dated December 2000)<sup>472</sup>. In that document, it was stated that

continuous improvement acknowledges that what is achievable in environmental management terms varies with the passage of time through the development of more effective and efficient practices, technologies and capabilities. Therefore, achieving the best possible air quality (whether by managing emissions from specific industries or source types, or through the decisions and actions of individuals) is a continuous exercise in evaluating and, wherever practicable, adopting measures to reduce emissions and improve air quality<sup>473</sup>.

731. Dr Denison confirmed that the focus of SEPP (AQM) on minimising emissions and driving continuous improvement in air quality was a major shift from the “just meeting numbers” approach in the previous SEPP<sup>474</sup>.

<sup>469</sup> Dual Gas, Application for review in 1829/2011, DGA.260.008 at DGA.260.014 (paragraphs 7(a) and (c))

<sup>470</sup> Denison, cross-examination, P1617 L14-15

<sup>471</sup> SEPP (AQM), EPA.050.050 at EPA.050.052 (clause 6(b))

<sup>472</sup> EPA, Protecting Victoria’s Air Environment, publication 728, December 2000, [http://epanote2.epa.vic.gov.au/EPA/publications.nsf/d85500a0d7f5f07b4a2565d1002268f3/db142e7cf6b70a74a2569b2002764cd/\\$FILE/728.pdf](http://epanote2.epa.vic.gov.au/EPA/publications.nsf/d85500a0d7f5f07b4a2565d1002268f3/db142e7cf6b70a74a2569b2002764cd/$FILE/728.pdf)

<sup>473</sup> EPA, Protecting Victoria’s Air Environment, publication 728, December 2000 at p48

<sup>474</sup> Denison, expert witness statement by way of reply, EPA.100.556 at EPA.100.557 (paragraph 7); Denison, examination, P1577 L4-9

*Dr Bellair's interpretation and application of best practice*

732. Dr Bellair stated that the DGDP should be considered holistically when considering whether the best practice requirement has been met, rather than considering each component of the plant individually<sup>475</sup>. As noted above<sup>476</sup>, the EPA considers that this is not the correct interpretation of "best practice" in SEPP (AQM) and further submits that, in making these statements, Dr Bellair is straying outside the area of his expertise and into areas of legal interpretation.
733. Dr Bellair concludes that "the technology to be employed in Dual Gas's demonstration project clearly represents "best practice" in the relevant "industry sector or activity" (the generation of electricity from brown coal) in terms of minimisation of emissions"<sup>477</sup>.
734. As Dr Bellair is an environmental scientist, not an expert in the technology to be employed in the DGDP, he does not have the expertise to conclude that that technology "clearly represents" best practice.
735. Dr Bellair has based his conclusion, not on his own expertise, but on advice from Dual Gas<sup>478</sup> and his selective interpretation of advice given to the EPA during the assessment of the works approval application<sup>479</sup>. In fact, Dr Bellair conceded that he hasn't "made an assessment of the complex technical economic issues and so on, because I'm not – that's for others to do"<sup>480</sup>, that "I haven't looked at all of the issues, technical, economic"<sup>481</sup> and that "it's a complex area which ... I am not able to form a view on overall"<sup>482</sup>.
736. Assessing whether an emitter is proposing to apply best practice to the management of its emissions requires a detailed assessment of the different techniques, methods, processes or technology that may be available to reduce emissions and consideration of the technical, logistical and financial considerations relevant to the various options. The only expertise Dr Bellair has to add to that assessment is the extent to which different options may reduce emissions and environmental impact. He does not have the expertise to make an overall determination as to whether Dual Gas is proposing to apply best practice as required under clause 19(1) of SEPP (AQM).
737. Also, Dr Bellair's opinions on the meaning of best practice appear to be tainted by his view that there are deficiencies in SEPP (AQM). In particular, Dr Bellair considers that

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<sup>475</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.056

<sup>476</sup> See paragraph 153 to 164

<sup>477</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047

<sup>478</sup> Bellair, examination, P1664 L26-30

<sup>479</sup> For example, Dr Bellair's reference in his expert witness statement to Maarten van der Burgt's conclusion (see: Bellair, expert witness statement, DGA.200.033 at DGA.200.048; Bellair, examination P1675 L11-15) and Mr Tsesmelis's comment that Mr Van der Burgt's conclusion is subject to a number of significant provisos (Tsesmelis, expert witness statement by way of reply, EPA.100.507 at EPA.100.511-512 (paragraphs 26 to 29))

<sup>480</sup> Bellair, examination, P1664 L20-38

<sup>481</sup> Bellair, cross-examination, P1705 L23-24

<sup>482</sup> Bellair, cross-examination, P1706 L13-14

the best practice requirement is inconsistent with the aims and principles of the SEPP (AQM)<sup>483</sup>, that “you can’t have continuous improvement forever”<sup>484</sup> and that “sometimes clauses go in there that aren’t carefully scrutinised and become law”<sup>485</sup>. Further, Dr Bellair appears to believe that the Tribunal does not fully apply SEPP (AQM), saying that “VCAT does not get involved in the contextual issues [ie. the policy shift to focus on continuous improvement]...to a large extent. It focuses in my experience on achieving the criteria that is set out in the policy”<sup>486</sup>.

738. In light of this, the EPA submits that no weight should be given to Dr Bellair’s opinions regarding the application of best practice.
739. Further if Dr Bellair’s description is correct, the EPA encourages the Tribunal to depart from that approach, especially in the context of climate change policy where continuous improvement is especially pertinent.

*Dr Bellair’s opinion that SO<sub>2</sub> reduction is not justified*

740. In his expert witness statement, Dr Bellair stated that he does not consider that the installation of SO<sub>2</sub> removal technology can be justified at this stage<sup>487</sup>.

741. Dr Bellair based his conclusion on the following:

- (a) No existing Victorian power station has been required to install equipment to reduce SO<sub>2</sub> emissions, while the SO<sub>2</sub> emissions from the DGDP will be substantially less than from other power stations relative to electricity production<sup>488</sup>.

The EPA submits that, when assessing best practice, it is not sufficient to benchmark the DGDP against 30 year old power stations in the Latrobe Valley.

- (b) Although the technology for capturing SO<sub>2</sub> is available (at a substantial cost) this equipment would become redundant if CO<sub>2</sub> capture is implemented<sup>489</sup>.

In cross-examination, Dr Bellair clarified that his “gut feeling” was that SO<sub>2</sub> removal was a substantial cost when it was in excess of \$100 million<sup>490</sup>. He conceded that he is not an expert in this regard<sup>491</sup>.

It is also clear from the evidence of Mr Tsesmelis and Mr Blatchford (who are both technology experts) that sulfur reduction equipment is available for less

<sup>483</sup> Bellair, examination, P1659 L25-26

<sup>484</sup> Bellair, cross-examination, P1688 L23

<sup>485</sup> Bellair, cross-examination, P1690 L7-9

<sup>486</sup> Bellair, cross-examination, P1689 L17-20

<sup>487</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (6<sup>th</sup> paragraph)

<sup>488</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (5<sup>th</sup> paragraph)

<sup>489</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (5<sup>th</sup> paragraph)

<sup>490</sup> Bellair, cross-examination, P1709 L3-14

<sup>491</sup> Bellair, cross-examination, P1709 L11-12

than \$100 million and that such equipment would not become redundant if CO<sub>2</sub> capture is implemented.

- (c) The SO<sub>2</sub> emissions comply with all provisions of SEPP (AQM)<sup>492</sup>.

The EPA disagrees on the basis that the requirement to apply best practice to the management of SO<sub>2</sub> emissions (clause 19(1) of SEPP (AQM)) is not met.

- (d) The SO<sub>2</sub> emissions will make essentially no contribution to maximum predicted SO<sub>2</sub> concentrations in the Latrobe Valley<sup>493</sup>.

The EPA accepts that the SO<sub>2</sub> emissions from the proposed 600MW plant will not significantly increase the maximum predicted ground level concentrations in the location where the design criterion is currently being exceeded. However, the SO<sub>2</sub> emissions from the plant will increase ground level concentrations of SO<sub>2</sub> in the vicinity of the plant and at the discrete receptors.

742. In his evidence, Dr Bellair also referred to social and economic impacts and the reduced electricity output per tonne of coal but did not substantiate those alleged consequences of SO<sub>2</sub> reduction<sup>494</sup>.

743. Notwithstanding his conclusion that SO<sub>2</sub> reduction is not justified, Dr Bellair stated in his expert witness statement that “An important “bonus” of implementing pre-combustion carbon capture (from the syngas stream) at the demonstration project is that the technology necessarily also achieves SO<sub>2</sub> removal, *which will result in a very substantial reduction in SO<sub>2</sub> emissions*”<sup>495</sup> (our emphasis).

744. Although that statement clearly expresses an opinion that a very substantial reduction in SO<sub>2</sub> emissions would be an important “bonus” of carbon capture and storage, during cross-examination Dr Bellair denied that that is what he meant and stated that the bonus he was referring to was the reduction in greenhouse gas emissions that would be achieved by carbon capture and storage.

*Mr Blatchford's opinions on whether SO<sub>2</sub> reduction is best practice*

745. When asked whether the proposed sulfur reduction equipment is best practice, Mr Blatchford responded “yes, it's not far off”<sup>496</sup>.

746. The primary reason for his opinion that such equipment should not be required in this case was that the SO<sub>2</sub> emissions from the proposed DGDP meet the design criteria in the SEPP (AQM)<sup>497</sup>. As outlined earlier in these submissions, the requirement in

<sup>492</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (6<sup>th</sup> paragraph)

<sup>493</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (6<sup>th</sup> paragraph)

<sup>494</sup> Bellair, examination, P1667 L9-11

<sup>495</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.047 (4<sup>th</sup> paragraph)

<sup>496</sup> Blatchford, cross-examination, P794 L22-28

<sup>497</sup> Blatchford, cross-examination, P795 L3-6

SEPP (AQM) to apply best practice is separate from and additional to the requirement to meet the design criteria.

747. In his evidence, Mr Blatchford also contended that whether sulfur reduction equipment should be required depends on the actual effects of the emissions and that there is a trade-off between the cost of the equipment and the impact of the emissions<sup>498</sup>. The EPA agrees but submits that, as Mr Blatchford is not a health expert, he does not have the expertise to determine whether the financial cost to Dual Gas of installing sulfur reduction equipment will outweigh the health benefits that would result from SO<sub>2</sub> reduction. Therefore no weight should be given to his opinion on this issue.

***The capital and operating cost of the works will increase the per unit cost of electricity production***<sup>499</sup>

*Estimated capital and operating costs*

748. Various estimates for the capital cost of sulfur reduction equipment have been presented by Dual Gas during the assessment of the works approval application and before and during the hearing.
749. Dual Gas's first estimate was \$20 million<sup>500</sup>. This was provided to the EPA during the EPA's assessment of Dual Gas's works approval application. The EPA relied on this estimate when determining Dual Gas's works approval application<sup>501</sup>.
750. After it lodged its application to review condition 3.1(a), Dual Gas revised that estimate to "in the vicinity of \$100 million"<sup>502</sup>.
751. Mr Walton increased the estimate again, this time to \$120 million for a 300MW facility and \$195 million for a 600MW facility<sup>503</sup>. Mr Walton also gave an estimate of operating costs of between \$1 million and \$5 million each year<sup>504</sup>.
752. Although Mr Blatchford did not comment on the cost of sulfur reduction equipment in his expert witness statement, he responded to Mr Tsesmelis's cost estimate in his reply statement dated 21 October 2011. Mr Blatchford stated that "a revised cost estimate of a fully installed Selexol plant with a Claus S recovery system together with the additional equipment items required for the DGDP...is around \$90 M for a 300MW unit"<sup>505</sup>.
753. Mr Blatchford did not give a cost estimate for operating costs.

<sup>498</sup> Blatchford, cross-examination, P797 L10-13

<sup>499</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraph 7(e))

<sup>500</sup> Walton, PowerPoint presentation given to the Tribunal during examination, 3 November 2011 at 13; Walton, examination, P1264 L30

<sup>501</sup> EPA, Assessment Report for WA67043, EPA.010.108 at EPA.010.133

<sup>502</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.031 (paragraph 13(a))

<sup>503</sup> Walton, witness statement, DGA.200.115 at DGA.200.124

<sup>504</sup> Walton, witness statement, DGA.200.115 at DGA.200.125

<sup>505</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.220

754. Mr Blatchford's cost estimate is qualified by his comment that "detailed design and process optimisation (including a full assessment of available sulfur capture technologies and engagement with suppliers) has not been conducted that would allow more accurate capital and operating cost and plant performance assessments"<sup>506</sup>.
755. It is not clear whether Dual Gas is still relying on Mr Walton's estimate of operating costs given that his estimate of capital cost was subsequently revised down by 25%. Also, he did not explain how he calculated that estimate and therefore it is not possible to determine whether it is reliable.
756. The EPA obtained its own estimate of the cost of installing sulfur reduction equipment from Mr Tsesmelis. In his expert witness statement, Mr Tsesmelis recommended a single stage Selexol unit (and Dual Gas has subsequently agreed that that would be feasible), at a +/-40% cost estimate of \$20 million<sup>507</sup>.
757. In his Notification to the Tribunal dated 7 November 2011<sup>508</sup>, Mr Tsesmelis confirmed that his estimate was an installed cost for a stage 1 Selexol unit together with a Claus unit for sulfur removal (not simply a purchased equipment cost). This had been queried by Mr Blatchford<sup>509</sup>.
758. Mr Tsesmelis had not included cooling, rehumidification or reheating in his initial cost estimate because he did not have any data on design temperature or composition of the syngas. These additional items were accounted for, broadly, in the +/- 40% accuracy of the estimate. In light of Mr Blatchford's statement of reply dated 21 October 2011, Mr Tsesmelis recalculated his estimate including these items and gave a Total Installed Cost estimate of "in the region of \$30m to \$35m" (including some additional margin)<sup>510</sup>.
759. Mr Tsesmelis did not include owner's costs, legal costs and insurance in his estimate because these are usually applied to the total plant facility and the incremental costs for the addition of sulfur recovery will be small<sup>511</sup>. However, he included all other installed cost items referred to by Mr Blatchford<sup>512</sup>.
760. In Mr Tsesmelis's expert opinion, the \$90 million revised cost estimate presented by Mr Blatchford and the earlier \$120 million estimate presented by Mr Walton for sulfur recovery are both too high<sup>513</sup>.

<sup>506</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.220

<sup>507</sup> Tsesmelis, expert witness statement, EPA.100.001 at EPA.100.008 (paragraph 10)

<sup>508</sup> Tsesmelis, Notification to the Tribunal, 7 November 2011 (paragraph 1)

<sup>509</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.219 (section 4)

<sup>510</sup> Tsesmelis, Notification to the Tribunal, 7 November 2011 (paragraph 10)

<sup>511</sup> Tsesmelis, Notification to the Tribunal, 7 November 2011 (paragraph 7)

<sup>512</sup> Tsesmelis, Notification to the Tribunal, 7 November 2011 (paragraph 7)

<sup>513</sup> Tsesmelis, Notification to the Tribunal, 7 November 2011 (paragraph 11)

761. Of the two final capital cost estimates for sulfur reduction equipment, Mr Tsesmelis's \$30 - \$35 million and Mr Blatchford's \$90 million, the EPA submits that Mr Tsesmelis's estimate is more likely to be reliable. It is clear from Mr Blatchford's evidence that he, at least in part, was speaking on behalf of Dual Gas/HRL and it was not clear whether the estimate he presented was his independent expert opinion or a position taken by his employer. Examples of statements where Mr Blatchford appeared to be speaking as a company representative on this topic include:

- "HRLD agrees that the use of Selexol and Claus technologies could be feasible for the DGDP"<sup>514</sup>; and
- "For the DGDP there will be additional syngas processing steps and costs (outlined below) which HRLD believe may not have been included in Tsesmelis's cost estimate"<sup>515</sup>.

*The impact on the unit capital cost of the DGDP*

762. Mr Walton calculated that, if the capital cost of SO<sub>2</sub> reduction equipment was \$90 million, this would increase the cost per KW installed by \$300 (an 8% increase)<sup>516</sup>. He did not calculate the impact on the cost per KW installed based on Mr Tsesmelis's cost estimate. A rough calculation based on the percentage difference between \$90 million and \$35 million (the upper limit of Mr Tsesmelis's estimate) indicates that, the cost per KW installed would increase by \$117 (a 3% increase, assuming Mr Walton's initial cost per KW installed is correct).

763. Given the lack of transparency regarding the calculation of the estimated cost of the DGDP, it is not possible to assess the reliability of Mr Walton's evidence on this point.

*Is the cost of sulfur reduction equipment a significant issue?*

764. The EPA submits that the cost implications of condition 3.1(a) are not as significant as Dual Gas has claimed.

765. In particular, the EPA notes that, in Dr Washusen's expert opinion, an additional \$100 million cost for sulfur reduction equipment (even if correct) is not necessarily material in terms of the overall impact on a \$1.7 or \$2 billion project<sup>517</sup>. He agreed that Counsel for Dual Gas's contention that an extra \$100 million would add about 2% to the LCoE sounds about the right magnitude (although he hadn't done the calculation)<sup>518</sup>. Clearly it would be even less material if the cost is in fact closer to the \$30 - \$35 million estimated by Mr Tsesmelis.

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<sup>514</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.219 (3<sup>rd</sup> paragraph)

<sup>515</sup> Blatchford, expert witness statement by way of reply, DGA.200.216 at DGA.200.220 (1<sup>st</sup> line)

<sup>516</sup> Walton, PowerPoint presentation given to the Tribunal during examination, 3 November 2011 at 13

<sup>517</sup> Washusen, examination, P1343 L23-25

<sup>518</sup> Washusen, cross-examination, P1463 L12-17

766. Further, although Mr Walton initially stated that the additional cost of sulfur reduction would “significantly reduce the commercial viability of the DGDP”<sup>519</sup>, at the hearing he appeared to change his mind, saying that he was not contending that the additional cost of sulfur reduction equipment would undermine the commerciality of the project or make the project unviable<sup>520</sup>.

767. In fact, Mr Walton accepted that Dual Gas would be required to install SO<sub>2</sub> reduction equipment in the future and that it is a timing issue rather than a cost issue. In cross-examination, he stated that

The most significant point is that it’s \$90m which would happen anyway when carbon capture is installed, because to install carbon capture, you have to do sulfur capture, and so it’s an impost on an earlier cost on the project<sup>521</sup>.

768. As Dual Gas appears to be resigned to installing carbon capture equipment, which necessarily means it must install SO<sub>2</sub> capture, the EPA submits that in accordance with best practice and in order to protect the environment SO<sub>2</sub> reduction equipment should be installed from the outset.

769. Any benefit from deferral until carbon capture technology is installed does not, in Dr Denison’s opinion (with which the EPA agrees) “address the potential impacts on the health of the local community in the interim and does not justify the release of uncontrolled emissions of SO<sub>2</sub>”<sup>522</sup>.

***Additional power usage due to the sulfur capture plant will increase GHG emissions***<sup>523</sup>

770. In its response to the EPA’s Request for Further Particulars, Dual Gas stated that it estimates that the energy consumption of the sulfur reduction works would be 1MW and that given the emission intensity of the DGDP, the works will generate up to 7000 tonnes of CO<sub>2</sub> per year<sup>524</sup>.

771. Mr Walton included the 7000 tonnes of CO<sub>2</sub> per year figure in his witness statement<sup>525</sup>.

772. The question of whether sulfur reduction should be required - given that it requires 1 MW of electricity per year to operate it<sup>526</sup> and that GHG emissions will be attributable to the generation of that electricity - requires a trade-off between the GHG emissions and the benefits of sulfur reduction.

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<sup>519</sup> Walton, witness statement, DGA.200.115 at DGA.200.118 (section 2.2)

<sup>520</sup> Walton, cross-examination, P1417 L11-17

<sup>521</sup> Walton, cross-examination, P1418 L4-8

<sup>522</sup> Denison, expert witness statement by way of reply, EPA.100.556 at EPA.100.560 (paragraph 36)

<sup>523</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraph 7(f))

<sup>524</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.032 (paragraph 14)

<sup>525</sup> Walton, witness statement, DGA.200.115 at DGA.200.125

<sup>526</sup> Walton, witness statement, DGA.200.115 at DGA.200.125

773. The EPA submits that if it is correct that 7000 tonnes of CO<sub>2</sub> per year would be attributable to the generation of electricity to operate the sulfur reduction unit, this is marginal in terms of the up to 1.6 million tonnes of CO<sub>2</sub>-e that would be emitted per year (from a 300MW plant)<sup>527</sup> and is offset by the health benefits of reducing the amount of SO<sub>2</sub> emitted into the Latrobe Valley Air Quality Control Region. This is consistent with the principle of integrated environmental management in section 1J of the EP Act (and clause 7(9) of SEPP (AQM)), which provides that

If approaches to managing environmental impacts on one segment of the environment have potential impacts on another segment, the best practicable environmental outcome should be sought.

774. Further, the installation of sulfur reduction equipment will only lead to an increase in total GHG emissions from the DGPD if Dual Gas decides to generate more electricity specifically for the operation of that equipment (rather than marginally reducing the amount of electricity it sends to the grid).

775. The quantity of additional GHG would also depend on the proportions of natural gas and syngas used in the generation of the additional electricity (if this is the approach adopted).

776. If calculated on the “as generated” basis for which Dual Gas contends, there would be no increase in the GEI of the plant because it would still generate the same volume of GHG per MW of electricity. How the generated electricity is used is not relevant to the calculation of GEI on the basis of “as generated” output.

777. It is true that the use of electricity for the SO<sub>2</sub> reduction equipment would marginally increase GEI on an “as sent out” basis (because marginally less electricity would be sent to the grid and the volume of GHG/MW generated would remain the same). However, the effect on revenue of such an increase is unquantified and unsubstantiated. The only possible sources of revenue impact are (a) the opportunity cost of being unable to sell the electricity consumed by the equipment; and (b) the need to use a marginally greater amount of natural gas to keep the GEI at or below 0.8. Since the latter is something Dual Gas plans to do anyway, and one of its operating scenarios is operation solely on natural gas, it is unimaginable that the consumption of electricity by the SO<sub>2</sub> reduction equipment would make any significant difference to projected revenue and profitability.

778. In summary,

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<sup>527</sup> McIntosh, expert witness statement, EPA.100.387-R at EPA.100.392-R (paragraph 12)

- (a) the use of sulfur reduction equipment need not increase GHG emissions (if the electricity is consumed from the volume of electricity which Dual Gas currently proposes to generate);
- (b) whether or not additional electricity is generated for the purpose, the GEI of the plant on an “as generated” basis will not increase;
- (c) the only operational consequence of the marginal increase in the GEI of the plant on an “as sent out” basis is potentially to require Dual Gas to use more natural gas to dilute the syngas than would otherwise be the case;
- (d) the operational scenarios presented by Dual Gas already accommodate (c) and even contemplate operation solely on natural gas; and
- (e) the claimed impact on revenue is unsubstantiated and is effectively limited to the opportunity cost of the electricity consumed by the equipment – i.e. tantamount to the direct cost of running the equipment.

779. Seen in this context, Mr Blatchford’s claimed effects are at best inflated and at worst dictated by company opposition to the concept of SO<sub>2</sub> reduction.

780. It is also interesting to compare Dual Gas’s concern regarding the 7000 tCO<sub>2</sub>-e/yr that it alleges will be attributable to the operation of sulfur reduction equipment with its explicit lack of concern regarding the additional 44,000 tCO<sub>2</sub>-e/year that it has calculated would be emitted if GT2 is an E class gas turbine (rather than an F class)  
<sup>528</sup>.

***If the works operate on natural gas only, the SO<sub>2</sub> emissions are close to zero***<sup>529</sup>

781. The EPA accepts that if the DGDP operates solely on natural gas, the SO<sub>2</sub> emissions would be close to zero.

782. However, this would only occur if the demonstration of IDG1 is unsuccessful.

783. Dual Gas’s arguments on the likelihood that the demonstration of IDG1 will be successful vary according to what is convenient to its case. For example, in relation to the risk that the DGDP may end up with 2 less efficient E class gas turbines operating solely on natural gas, Dual Gas is contending that it is very likely that the demonstration will be successful.

784. The EPA submits that the possibility that the DGDP will operate solely on natural gas must be taken into account, but it cannot be relied upon to give comfort that the SO<sub>2</sub> emissions from the DGDP will be acceptably low.

<sup>528</sup> Blatchford, examination, P728 L24-27

<sup>529</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraph 7(b))

***The condition would require additional works that are not the subject of the works approval application***<sup>530</sup>

785. In its response to the EPA's Request for Further Particulars, Dual Gas confirmed that the additional works would include additional plant and equipment (including a separate stand-alone facility to implement the 90% reduction in SO<sub>2</sub>)<sup>531</sup>.
786. Dual Gas has not advanced this ground during the hearing, presumably because it is clear from section 21(1) of the EP Act that the EPA has the power to impose conditions that require the installation of pollution control equipment.

***The condition does not advance the principles of environment protection and the condition is unreasonable***<sup>532</sup>

787. In its response to the EPA's Request for Further Particulars, Dual Gas confirmed that it is referring to the principle of integration of economic, social and environmental considerations and that condition 3.1(a) is unreasonable because it contends that it is contrary to that principle<sup>533</sup>.
788. Dual Gas also confirmed that it contends that the works are not necessary to meet any requirement of any applicable SEPP or standard and as such are not cost effective contrary to the principle of integration<sup>534</sup>.
789. For the reasons already outlined, the EPA submits that SO<sub>2</sub> reduction is necessary to meet the best practice requirement in clause 19(1) of the SEPP (AQM) and to maintain the regional air quality within the Latrobe Valley Air Quality Control Region in accordance with clause 30 of SEPP (AQM).
790. Also, the EPA submits that the cost of SO<sub>2</sub> reduction is not material in the context of the project as a whole and notes that Dual Gas appears to be resigned to incurring this cost in the future.

## **16.10 DEA's Grounds of Review**

***The proposed works do not apply best practice to the management of SO<sub>2</sub> emissions***<sup>535</sup>

791. In its response to the EPA's Request for Further Particulars, DEA stated that to apply best practice to the management of SO<sub>2</sub> emissions, the proposed works need to be compared with power generation by renewable energy technologies in the power generating industry nationally and internationally and not solely existing coal fired

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<sup>530</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraph 7(d))

<sup>531</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.031 (paragraph 12)

<sup>532</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.014 (paragraphs 7(h) and (i))

<sup>533</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.032 (paragraph 15)

<sup>534</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.032 (paragraph 15)

<sup>535</sup> DEA, Further Particulars - Statement of Grounds, DEA.460.014 (section 1)

plants in the Latrobe Valley<sup>536</sup>. DEA relies on the approach advanced by Professor Outhred (on behalf of EV/LIVE)<sup>537</sup>.

792. The EPA agrees that, in determining what is required in order to apply best practice to the management of SO<sub>2</sub> emissions, it is not sufficient to benchmark the proposed DGDP against existing coal fired plants in the Latrobe Valley.
793. However, the EPA submits that the requirement to apply best practice to the management of emissions does not extend to considering, or requiring, fundamentally different proposals.
794. Rather, the focus is on whether alternative or additional techniques, methods, processes or technologies that would demonstrably reduce SO<sub>2</sub> emissions are practically available.
795. In this case, the EPA has determined that SO<sub>2</sub> reduction equipment is practically available, would demonstrably reduce SO<sub>2</sub> emissions from the DGDP and therefore should be installed.

***The precautionary principle has not been properly applied to the assessment of health impacts of SO<sub>2</sub>***<sup>538</sup>

796. As DEA has highlighted, there has been considerable research undertaken on the health impacts of SO<sub>2</sub> and there is general agreement amongst health professionals that there is no safe level of SO<sub>2</sub>.
797. As outlined previously, the precautionary principle is only triggered when there is a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage (Preston CJ in *Telstra Corporation Limited v Hornsby Shire Council* [2006] NSWLEC 133 at 128).
798. It is therefore possible that the precautionary principle does not apply to SO<sub>2</sub> emissions and that, instead, mitigation measures are required to deal with an identified, “scientifically certain” risk.
799. If this is incorrect and the precautionary principle applies because the extent of health impacts at different SO<sub>2</sub> levels have not been quantified, the EPA submits that this makes no practical difference in that the precautionary measures to address the risk are the same as the proposed mitigation measures.
800. As previously noted, the precautionary principle does not require a project to be refused. Given that SO<sub>2</sub> emissions can be all but eliminated by the recommended SO<sub>2</sub> reduction equipment and would have a negligible effect on the Latrobe Valley air shed,

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<sup>536</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.020

<sup>537</sup> DEA, Outline of Submissions, DEA.450.001 at DEA.450.009

<sup>538</sup> DEA, Further Particulars - Statement of Grounds, DEA.460.014 (section 2)

the appropriate risk-weighted option is for the 300MW DGDP to proceed subject to condition 3.1(a) requiring the installation and use of that equipment.

### **Conclusion**

801. The EPA submits that condition 3.1(a) is required in order to ensure that Dual Gas complies with its obligation under SEPP (AQM) to apply best practice to the management of the SO<sub>2</sub> emissions from the DGDP.
802. The Tribunal may also impose a condition requiring SO<sub>2</sub> reduction under clause 30 of SEPP (AQM) and/or under section 20C(3A) of the EP Act.
803. The EPA submits that the requirement to install and use SO<sub>2</sub> reduction technology is justified as SO<sub>2</sub> reduction equipment is commonly available, can feasibly be incorporated into the DGDP and would reduce potential health impacts on the affected community<sup>539</sup> (and the associated reduction in costs to the economy). Further, the EPA submits that the cost of SO<sub>2</sub> reduction is not material in the context of the project as a whole and is in proportion to the significance of the environmental problem being addressed. The EPA also notes that Dual Gas appears to be resigned to incurring this cost in the future.
804. Whether or not the precautionary principle applies, condition 3.1(a) is an appropriate response to scientifically certain and uncertain risks from SO<sub>2</sub> in that it all but eliminates SO<sub>2</sub> emissions.
805. If the Tribunal finds to the contrary, the EPA submits that the SO<sub>2</sub> emissions from the DGDP should be minimised by requiring Dual Gas to monitor the sulfur content in the coal that is to be fed into the plant and to reject coal that contains more than a specified level of sulfur.
806. In particular, Dual Gas should be required to reject coal that has a sulfur content greater than that assumed by Mr Blatchford in the calculations of SO<sub>2</sub> emission rates he submitted to the Tribunal during the hearing<sup>540</sup>.
807. Although any such requirement would be imposed on the operating licence, it should be foreshadowed in the works approval so that there is no room for argument that the conditions on the licence are inconsistent with the conditions in the works approval.

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<sup>539</sup> Denison, examination, P1584 L1-3; Denison, expert witness statement, EPA.100.370 at EPA.100.377

<sup>540</sup> Blatchford, updated SO<sub>2</sub> emission rates, 16 November 2011, Exhibit D11

## 17 Emission of Nitrogen Oxides (NO<sub>x</sub>)

### 17.1 NO<sub>x</sub> emission rate and ground level concentrations of nitrogen dioxide (NO<sub>2</sub>)

808. The NO<sub>x</sub> emission rate for the proposed DGDP provided by Dual Gas in its Works Approval Application was 47 ppm (0.09 g/m<sup>3</sup>), or 53 ppm (0.1 g/m<sup>3</sup>) when the duct burners are operating to achieve peak load<sup>541</sup>.
809. Immediately prior to the hearing, Dual Gas advised that it had incorrectly calculated the NO<sub>x</sub> emission rate<sup>542</sup>. Dr Bellair's revised predicted maximum (volume weighted) average concentration of NO<sub>x</sub> emissions attributable to all sources at the DGDP is 0.14 g/m<sup>3</sup>.<sup>543</sup>
810. Dual Gas engaged URS to model the impact of the NO<sub>x</sub> emissions from the 600 MW DGDP on ground level concentrations of nitrogen dioxide (NO<sub>2</sub>), using the updated NO<sub>x</sub> emission rate. URS's modelling predicted that the maximum average ground level concentration of NO<sub>2</sub> would be 0.13 mg/m<sup>3</sup>.<sup>544</sup>
811. The EPA requested Dr Ross to re-run his modelling using the updated NO<sub>x</sub> emission rate. Dr Ross's modelling predicted that the maximum ground level concentration of NO<sub>2</sub> would be 0.15 mg/m<sup>3</sup>.<sup>545</sup> Dr Ross considers that the methodology/configuration adopted by URS in its modelling is deficient in various respects<sup>546</sup>.

### 17.2 Application of SEPP (AQM)

812. The EPA considers that the key aspects of SEPP (AQM) with respect to the NO<sub>x</sub> emissions from the DGDP are the requirement on Dual Gas to apply best practice (clause 19(1)), the requirement on Dual Gas to comply with the design criteria (Schedule A), the requirement on Dual Gas to comply with the emission limits (Schedule E) and the availability of an exemption from the emission limits (clause 22).

#### ***Best practice***

813. Unlike gas turbines operated solely on natural gas, dry low NO<sub>x</sub> burners to reduce NO<sub>x</sub> emission levels cannot be used with syngas due it is low calorific value and higher

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<sup>541</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.134-R

<sup>542</sup> Blatchford, supplementary expert witness statement, DGA.200.216 at DGA.200.221

<sup>543</sup> Bellair, amended section 3.1 of 22 September 2011 Witness Statement, as described in Bellair, examination, P1652 L24-P1653 L17

<sup>544</sup> Ross, supplementary expert witness statement, EPA.100.564 at EPA.100.567 (paragraph 9)

<sup>545</sup> Ross, examination, P1539 L5; Ross, supplementary expert witness statement, EPA.100.564 at EPA.100.567 (paragraph 10)

<sup>546</sup> Ross, supplementary expert witness statement, EPA.100.564 at EPA.100.566 (paragraph 6)

moisture content<sup>547</sup>. Instead, Dual Gas is proposing to use the following technologies to reduce NO<sub>x</sub> formation:

- (a) scrubbing of ammonia from the syngas (with a design of 95% ammonia removal) to reduce the formation of fuel NO<sub>x</sub> during combustion of syngas; and
- (b) steam injection to control thermal NO<sub>x</sub> formation when the gas turbines are operated on natural gas.

814. Also, exhaust gas recirculation will be used in the char burners to reduce flame temperature and thereby reduce NO<sub>x</sub> formation. Air heaters and pre-dryers are natural gas powered and will adopt standard technology to reduce NO<sub>x</sub> emissions<sup>548</sup>.
815. The EPA is satisfied that these proposed mitigation measures meet Dual Gas's obligation to apply best practice to the management of the NO<sub>x</sub> emissions (including when the plant is operating as a syngas plant).
816. DEA contends that determining "best practice" requires comparison of the NO<sub>x</sub> emissions from the DGDP against NO<sub>x</sub> emissions from electricity generated from renewable energy sources<sup>549</sup>.
817. As set out above<sup>550</sup>, the EPA disagrees with DEA's interpretation of "best practice".
818. Other than contending that Dual Gas should use a fundamentally different technology for the generation of electricity, DEA has not identified any alternative or additional techniques, methods, processes or technology that would reduce NO<sub>x</sub> emissions from the DGDP.
819. Currently, the Works Approval requires Dual Gas to provide for the installation of Dry Low NO<sub>x</sub> technology in the event that the plant ceases to operate as a syngas plant.

### ***Design criterion***

820. Dual Gas is required to comply with the design criteria set out in Schedule A of SEPP (AQM)<sup>551</sup>.
821. The only NO<sub>x</sub> for which there is a design criterion is NO<sub>2</sub>.
822. The design criterion for NO<sub>2</sub> is 0.1ppm (0.19 mg/m<sup>3</sup>) averaged over a 1 hour period.
823. Dr Ross's modelling confirms that the NO<sub>x</sub> emissions from the DGDP would lead to a domain maximum ground level concentration of 0.15 mg/m<sup>3</sup> of NO<sub>2</sub>, which is less than the design criterion of 0.19 mg/m<sup>3</sup>.<sup>552</sup>

<sup>547</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.134-R; see also McIntosh, expert witness statement, EPA.100.387-R at EPA.100.391-R

<sup>548</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.135-R

<sup>549</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.020 (paragraph 1(c)); see also DEA, opening submissions, P597 L4-8

<sup>550</sup> See paragraphs 791 to 795 above

<sup>551</sup> SEPP (AQM), EPA.050.050 at EPA.050.079 (paragraph (a), part C2, schedule C)

824. Neither Dual Gas nor DEA have disputed Dr Ross’s modelling.

**Emission limits**

825. As the site for the DGDP is within the Latrobe Valley Air Quality Control Region, the emission limits in Schedule E of SEPP (AQM) also apply<sup>553</sup>.

826. Schedule E provides the following relevant limits for NO<sub>x</sub>:

Source to which Emission Limit is Acceptable	Emission Limit	Notes
Power station boilers for electricity generation of rated output equal to or greater than 250MW	0.7 g/m <sup>3</sup> for solid fuels	This limit may be relaxed to 0.78 g/m <sup>3</sup> in individual cases where it can be shown that 0.7 g/m <sup>3</sup> is too restrictive in relation to such matters as the type of fuel being burned, existing emission control technology and factors of health and safety
Gas turbines for electricity generation: <ul style="list-style-type: none"> <li>- Rated output equal to or greater than 30 MW</li> <li>- Rated output less than 30 MW</li> </ul>	<ul style="list-style-type: none"> <li>a 0.07 g/m<sup>3</sup> for gaseous fuels</li> <li>b 0.15 g/m<sup>3</sup> for other fuels</li> <li>0.09 g/m<sup>3</sup> for gaseous fuels</li> </ul>	Nitrogen oxides calculated as NO <sub>2</sub> at a 15 per cent oxygen reference level.

827. The EPA and Dual Gas agree that the operation of gas turbines on syngas was not envisaged when the Schedule E emission limits were developed. However, they disagree on which emission source and fuel type best characterises the DGDP, and therefore, the applicable emission limit.<sup>554</sup>

828. The EPA considers that the correct source classification for the DGDP is “gas turbines for electricity generation” with a rated output equal to or greater than 30MW, which has a NO<sub>x</sub> emission limit of 0.07 g/m<sup>3</sup> for gaseous fuels and 0.15 g/m<sup>3</sup> for other fuels<sup>555</sup>. Accepting that the NO<sub>x</sub> emission limit for gaseous fuels may not be strictly applicable to syngas-fuelled turbines because this fuel was not contemplated when the limit was set,

<sup>552</sup> Ross, expert witness statement by way of reply, EPA.100.564 at EPA.100.567 (paragraph 10)

<sup>553</sup> SEPP (AQM), EPA.050.050 at EPA.050.083-086 (schedule E)

<sup>554</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.038 and DGA.200.046; Bellair, amended section 3.1 of 22 September 2011 expert witness statement, as described in Bellair, examination, P1652 L24-P1653 L17; EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.134-R

<sup>555</sup> It is apparent from other entries in Schedule E that the (a) and (b) emission limits both relate to gas turbines for electricity generation with a rated output equal to or greater than 30MW – see for example the entries for “Combustion particles”, “Oxides of nitrogen - fuel burning units” and “Fluorine compounds”

the EPA considers that application of the higher emission limit for turbines fuelled by “other fuels” may be justified<sup>556</sup>.

829. The EPA does not agree with Dual Gas that, because the base fuel is brown coal, the higher NO<sub>x</sub> limit for “power station boilers for electricity generation of rated output equal to or greater than 250 MW” operating on solid fuels should apply (i.e. 0.7 g/m<sup>3</sup>)<sup>557</sup>. The DGDP process is clearly not a power station “boiler”. Similarly, the EPA does not agree that the 0.5g/m<sup>3</sup> limit for “fuel burning units” using liquid or solid fuels applies – because syngas is not a solid or liquid fuel, and moreover, the DGDP can more appropriately be classified as “gas turbine for electricity generation”.
830. Dual Gas’s revised NO<sub>x</sub> emission rate of 0.14 g/m<sup>3</sup> is below the emission limit for power station boilers on solid fuels and for gas turbines fuelled by “other fuels”. However, it exceeds the limit for gas turbines fuelled by gaseous fuels (0.07 g/m<sup>3</sup>).
831. Given the lack of clarity about which emission limit should be applied, the EPA granted Dual Gas an exemption under clause 22(1) of SEPP (AQM) from the lower limit (but only while the DGDP operates as a syngas plant).
832. Under clause 22(1), the EPA (and therefore the Tribunal) may exempt the DGDP from compliance with any emission limit in Schedule E where Dual Gas can demonstrate that:
- (a) the discharge or emission does not cause design criteria in Schedule A to be exceeded and does not adversely affect any beneficial use of the environment; and (relevantly)
  - (b) compliance with a requirement contained in Schedule E cannot be achieved by the application of best practice.
833. The EPA is satisfied that the DGDP meets the criteria for an exemption from the NO<sub>x</sub> emission limit on the following bases:
- (a) Air emission modelling presented by both Dual Gas and the EPA confirms that the NO<sub>x</sub> emissions from the DGDP will not cause the Schedule A design criteria for NO<sub>2</sub> to be exceeded.
  - (b) The NO<sub>x</sub> emissions from the DGDP will only contribute a very small amount to the ground level concentrations and, in Dr Denison’s expert opinion, will not adversely affect any beneficial uses<sup>558</sup>.

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<sup>556</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.134-R

<sup>557</sup> Bellair, expert witness statement, DGA.200.033 at DGA.200.046 and DGA.200.054; Bellair, amended section 3.1 of 22 September 2011 Witness Statement, as described in Bellair, examination, P1652 L24-P1653 L17

<sup>558</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.381 (paragraph 84); Denison, expert witness statement by way of reply, EPA.100.556 at EPA.100.562 (paragraph 60); Denison, examination, P1588 L23-P1589 L12

- (c) The EPA is satisfied that compliance with the Schedule E emission limit for gaseous fuels cannot be achieved by the application of best practice for NO<sub>x</sub> emissions.
834. DEA contends that the DGDP should not be exempt from the emission limit for gas turbines operating on gaseous fuels because the NO<sub>x</sub> emissions will have an adverse effect on the “life, health and well-being of humans” beneficial use.
835. DEA has not provided the Tribunal with any evidence in support of this contention and has not displaced Dr Denison’s evidence concerning the lack of adverse impact on beneficial uses.
836. The EPA continues to support the grant of an exemption for the DGDP from the 0.07 g/m<sup>3</sup> limit for gaseous fuels under clause 22 of SEPP (AQM) for as long as the plant operates on syngas, despite the increase in the NO<sub>x</sub> emission rate from 0.09/0.1 g/m<sup>3</sup> to 0.14 g/m<sup>3</sup>.
837. It is noted that the debate about which emission limit applies to the DGDP need only be resolved if the Tribunal is not prepared to grant Dual Gas an exemption from the emission limit for gaseous fuels under clause 22(1) of the SEPP (AQM).

### **17.3 DEA’s Grounds of Review**

838. In relation to NO<sub>x</sub>, the DEA seeks orders that the Works Approval be set aside on various grounds<sup>559</sup>, the basis that:
- (a) the proposed works do not apply best practice to the management of its NO<sub>x</sub> emissions;
  - (b) the precautionary principle has not been properly applied to the assessment of health impacts of NO<sub>x</sub>;
  - (c) the discharge of NO<sub>x</sub> emissions exceeds emission limits in Schedule E to the SEPP (AQM) for gas turbines operating on gaseous fuels and the EPA cannot be satisfied that NO<sub>x</sub> emissions will not have an adverse effect on beneficial uses of “life, health and well-being” in order to grant an exemption from the emission limit; and
  - (d) the modelling of the NO<sub>x</sub> emissions is inadequate (on the basis that modelling has not been conducted over 24 hour average or annual average periods) (DEA accepts that this modelling has now been undertaken and has withdrawn this ground of review<sup>560</sup>).
839. The EPA’s response to ground (a) is set out above.

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<sup>559</sup> DEA, Further Particulars – Statement of Grounds, DEA.460.014 at DEA.460.014-015

<sup>560</sup> DEA, opening submissions, P603 L17-20

***Ground (b) - the precautionary principle has not been properly applied***<sup>561</sup>

840. DEA contends that the precautionary principle applies because the DGDP will emit significant amounts of NO<sub>x</sub> and adverse health effects from NO<sub>x</sub> can occur at below standard levels<sup>562</sup>.
841. As recognised by both DEA and Dr Denison, the impacts of NO<sub>x</sub> on human health are well known and documented<sup>563</sup>.
842. On this basis, the precautionary principle may not be triggered.
843. If this is incorrect and the precautionary principle applies, it does not mandate refusal of the project. Given the projected low levels of NO<sub>x</sub> and Dr Denison's evidence that, at that level, no beneficial use will be adversely affected<sup>564</sup>, the appropriate risk-weighted option is to permit the 300MW DGDP to proceed subject to the mitigation measures which Dual Gas has proposed (noting that these include all identified measures that are available given the nature of the fuel source).

***Ground (c) - the discharge of NO<sub>x</sub> emissions exceeds the emission limit in Schedule E to the SEPP (AQM) for gas turbines operating on gaseous fuels***<sup>565</sup>

844. This is correct. However, it is not certain that this is the correct characterisation of the DGDP and hence that this is the applicable limit. The "gaseous fuels" emissions limit was certainly not formulated with syngas in mind. As set out above, the emission limit for gas turbines operating on "other fuels" is not exceeded.

## **17.4 Conclusion**

845. The EPA considers that the correct NO<sub>x</sub> emission limit in Schedule E of SEPP (AQM) for the DGDP is either 0.07 g/m<sup>3</sup> (the limit for gaseous fuels) or 0.15 g/m<sup>3</sup> (the limit for other fuels). The EPA does not agree with Dual Gas's contention that the correct emission limit is 0.7 g/m<sup>3</sup> (the limit for "power station boilers for electricity generation of rated output equal to or greater than 250 MW" operating on solid fuels).
846. Dual Gas's revised predicted maximum (volume weighted) average concentration of NO<sub>x</sub> emissions attributable to all sources at the DGDP is 0.14 g/m<sup>3</sup><sup>566</sup> which is within the emissions limit for electricity generation from "other fuels", but not the limit for gaseous fuels.

<sup>561</sup> DEA, Application for review in P1818/2011, DEA.460.001 at DEA.460.013 (section 2)

<sup>562</sup> DEA, Further and Better Particulars, 24 August 2011, DEA.460.019 at DEA.460.021 (paragraph 3(b))

<sup>563</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.379 (paragraph 69)

<sup>564</sup> DEA, Further and Better Particulars, 24 August 2011, DEA.460.019 at DEA.460.021-022 (paragraph 4(a)(i)-(ii)); Denison, expert witness statement, EPA.100.370 at EPA.100.380-381 (paragraphs 83-84)

<sup>565</sup> DEA, Application for review in P1818/2011, DEA.460.001 at DEA.460.013 (section 3)

<sup>566</sup> Bellair, amended section 3.1.1 of 22 September 2011 Witness Statement, as described in Bellair, examination, P1652 L24-P1653 L17

847. The EPA has granted Dual Gas an exemption under clause 22(1) of SEPP (AQM) from the lower limit (but only while the DGDP operates as a syngas plant). The EPA continues to support the grant of this exemption, despite the increase in the advised NO<sub>x</sub> emission rate from 0.09/0.1 g/m<sup>3</sup> to 0.14 g/m<sup>3</sup> (or, according to Dr Ross, 0.15 g/m<sup>3</sup>), on the basis that Dual Gas's management of NO<sub>x</sub> is best practice for syngas, no design criteria are exceeded and, on the only evidence before the Tribunal, the emissions will not adversely affect any beneficial uses.
848. Given the low levels of NO<sub>x</sub> emissions, the appropriate precautionary response if the precautionary principle applies is for the 300MW DGDP to proceed on the basis of the proposed mitigation measures.

## 18 Particulate Emissions

### 18.1 Volume of particulate emissions

849. In the DGDP, particulates are emitted as a result of:
- (a) the transport and crushing of the coal prior to combustion (amounts unspecified)<sup>567</sup>;
  - (b) the combustion of syngas in the CCGT units (6 g/s); and
  - (c) the combustion of char in the char boilers (2 g/s).<sup>568</sup>
850. Dual Gas has estimated the emission rates of particles (PM<sub>10</sub>) to be 1080 g/min (when the DGDP is fuelled by syngas at 100% capacity) and 660 g/min (when it is fuelled by natural gas at 100% capacity)<sup>569</sup>.
851. The EPA does not dispute these estimated emission rates. No other evidence on the volume of particulate emissions from the DGDP has been put before the Tribunal.

### 18.2 Application of SEPP (AQM)

852. The EPA considers that the aspects of the SEPP (AQM) of immediate relevance to the emissions of particulates from the DGDP are the requirements to apply best practice to the management of emissions (clause 19(1)) and to comply with the design criteria (Schedule A).

#### ***Best practice***

853. The EPA is satisfied that Dual Gas is proposing to apply best practice to the management of particulate emissions from the DGDP.

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<sup>567</sup> Dual Gas, DGDP Application WA67043 – further information request Part 2, EPA.010.058-R at EPA.010.058-R-059-R (section 5)

<sup>568</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.324

<sup>569</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.356-357 (sections 7.1.1-7.1.2)

854. In particular, the EPA considers that the following aspects of the DGDP will mitigate the emissions of particulates:
- (a) the new parts of the coal delivery system will be enclosed and fitted with dust extraction systems at transfer points;
  - (b) a similar coal crushing plant to that proposed for the DGDP operates at Loy Yang B without causing obvious dust;
  - (c) metal filters will be used to clean particulates from the syngas prior to combustion; and
  - (d) char burners will be equipped with high efficiency bag filters to minimise particle emissions<sup>570</sup>.
855. The EPA is not aware, and no evidence has been led, of available technologies which would reduce the level of particulate emissions below what the above measures are able to achieve.
856. DEA contends that determining “best practice” requires comparison of the particulate emissions from the DGDP against particulate emissions from electricity generated from renewable energy sources<sup>571</sup>.
857. As set out above<sup>572</sup>, the EPA disagrees with DEA’s interpretation of “best practice”.
858. Other than contending that Dual Gas should use a fundamentally different technology for the generation of electricity, DEA has not identified any alternative or additional techniques, methods, processes or technology that would reduce particulate emissions from the DGDP.

### ***Design criteria***

859. The design criteria in SEPP (AQM) for emissions of particles (PM<sub>10</sub>) and fine particles (PM<sub>2.5</sub>) are:
- (a) PM<sub>10</sub> - 0.080 mg/m<sup>3</sup> averaged over a 1 hour period; and
  - (b) PM<sub>2.5</sub> - 0.050 mg/m<sup>3</sup> averaged over a 1 hour period.
860. Dr Ross’s modelling of the particulate emissions from the DGDP indicates that these emissions would be comfortably below these design criteria<sup>573</sup>.
861. There is no design criterion for emissions of ultrafine particles (PM<sub>0.1</sub>).

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<sup>570</sup> EPA, Assessment Report for WA 67043, EPA.010.108-R at EPA.010.135-R-EPA.010.136-R

<sup>571</sup> DEA, Further and Better Particulars, 24 August 2011, DEA.460.019 at DEA.460.020 (paragraphs 1(b)-(c))

<sup>572</sup> See paragraphs 791 to 795 above

<sup>573</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.123-124 and EPA.100.233 (sections 4.4.3, table 3, 4.1)

862. In its Further Particulars – Statement of Grounds, DEA claimed that there may be no safe level of ultra-fine (PM<sub>0.1</sub>) particles for human health<sup>574</sup>. However, DEA now accepts Dr Denison’s expert opinion that there is currently insufficient evidence of the impacts of ultra fine particles on human health from which to establish emission limits or design criteria and has stated that it will not pursue the aspects of its application for review related to these emissions<sup>575</sup>.

### 18.3 DEA’s Grounds of Review

863. DEA’s grounds of review set out in its Further Particulars – Statement of Grounds<sup>576</sup> are:

- (a) the proposed works do not apply best practice to the management of particulate emissions;
- (b) the precautionary principle has not been properly applied in the assessment of health impacts of particulate matter; and
- (c) there is no safe level of fine and ultra-fine particulate matter for human health, and on this basis further monitoring of particulate emissions is required.<sup>577</sup> (as set out above, this ground has since been withdrawn with respect to ultra-fine particulates).

864. The EPA’s response to ground (a) is set out above.

***Ground (b) the precautionary principle has not been properly applied***<sup>578</sup>

865. DEA contends that the precautionary principle applies because there may be no safe level of fine particles (PM<sub>2.5</sub>) for human health<sup>579</sup>. It says in its Outline of Submissions that a proper application of the precautionary principle would require “modelling and management of emissions from all sources” to ensure that the levels of particulates in the Latrobe Valley Air Quality Control Region do not exceed the SEPP (AQM) levels<sup>580</sup>.

866. As recognised by both DEA and Dr Denison, the impacts of particulates (PM<sub>10</sub>) and fine particles (PM<sub>2.5</sub>) on human health are well known and documented<sup>581</sup>, although the impacts of ultra fine particles are uncertain.

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<sup>574</sup> DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 at DEA.460.015 (section 5)

<sup>575</sup> DEA, Application for review in P1818/2011, DEA.460.001 at DEA.460.013 (section 5); DEA, opening submissions, P603 L4-13; DEA, Outline of Submissions, DEA.450.001 at DEA.450.014 (paragraphs 56-58)

<sup>576</sup> DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 at DEA.460.014-015 (sections 1-2, 5)

<sup>577</sup> DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 at DEA.460.015 (section 5)

<sup>578</sup> DEA, Application for review in P1818/2011, DEA.460.001 at DEA.460.013 (section 2)

<sup>579</sup> DEA, Further and Better Particulars, 24 August 2011, DEA.460.019 at DEA.460.021 (section 3)

<sup>580</sup> DEA, Outline of Submissions, DEA.450.001 at DEA.450.015 (paragraph 61)

<sup>581</sup> Denison, expert witness statement, EPA.100.370 at EPA.100.381; DEA, Outline of Submissions, DEA.450.001 at DEA.450.014-015 (paragraphs 59-60)

867. On the basis that the precautionary principle applies, at least to the impacts of ultra fine particles, the EPA considers that the best practice measures set out in paragraph 854 are an appropriate precautionary response.
868. The EPA further submits that it is not the business of a works approval to require management of emissions from other sources.
869. With respect to modelling, the EPA is satisfied from Dr Ross's review of HRL's modelling and his own modelling that ground level concentrations of particulates (which include a background concentration of 0.02 mg/m<sup>3</sup>) that both existing and predicted particulate emissions are not of an intensity which warrants modelling and management at the regional level.<sup>582</sup>

***Ground (c) - there is no safe level of particulate emissions and monitoring of particulate emissions should be required***<sup>583</sup>

870. Whilst it is not altogether clear how the case is put, DEA contends, separately, that monitoring of particulate emissions is necessary to ensure the protection of "life, health and well-being of humans", a beneficial use under SEPP (AQM)<sup>584</sup>.
871. The EPA accepts that it may be appropriate to require Dual Gas to monitor the particulate emissions from the DGDP in order to ensure that the design criteria are not exceeded. However, this is a matter for any operating licence that is issued for the DGDP and would not extend to monitoring from all sources.

## 19 Other Air Emissions – Class 3 Indicators and Mercury

### 19.1 Volume of emissions of class 3 indicators and mercury

872. Class 3 indicators (in particular arsenic, beryllium, cadmium, nickel, silica and lead) and mercury will be emitted to the atmosphere from the DGDP as small quantities of these substances are found in the brown coal which would be used to fuel the plant.
873. The emission rates for the class 3 indicators and mercury are set out in the Works Approval Application<sup>585</sup>.
874. Dual Gas expects that:
- (a) 2% of the mercury in the coal will be discharged to air through the vapour phase in the syngas;
  - (b) 30% of the remaining mercury will be discharged to air from the char boiler; and

<sup>582</sup> Ross, expert witness statement, EPA.100.103 at EPA.100.123 (paragraph 78), EPA.100.233 (section 4.1)

<sup>583</sup> DEA, Application for review in P1818/2011, DEA.460.001 at DEA.460.013 (section 5); DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 at DEA.460.015 (section 5)

<sup>584</sup> DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 at DEA.460.015 (section 5)

<sup>585</sup> Dual Gas, Dual Gas Demonstration Project Works Approval Application, EPA.020.292 at EPA.020.376; Dual Gas, Briefing Note – Mercury, EPA.010.027-R at EPA.010.030-R, 033-R

(c) all remaining mercury will be discharged with the ash from the char boiler.<sup>586</sup>

## 19.2 Application of SEPP (AQM)

### ***Best practice and reduction to the maximum extent achievable***

875. Clause 19(1) of SEPP (AQM) requires Dual Gas to apply best practice to the management of class 3 and mercury emissions and Clause 19(2) requires Dual Gas to reduce its class 3 emissions to the “maximum extent achievable” (**MEA**).
876. The EPA considers that because, in the case of coal processing or combustion, specific reduction measures for class 3 indicators or mercury are not available, reduction to the MEA (and therefore best practice in the management of emissions) is achieved through the use of highly efficient particle removal devices (which also remove some class 3 indicators and mercury) and efficient combustion (which reduces the total amount of emissions)<sup>587</sup>.
877. The DGDGP incorporates both these measures and accordingly the EPA is satisfied that Dual Gas satisfies these requirements of the SEPP (AQM)<sup>588</sup>.
878. DEA contends that best practice requires the refusal of the Works Approval because alternative electricity generation technology is available which does not emit “toxic compounds”<sup>589</sup> which (based on its explanation in its Further and Better Particulars) are Class 3 indicators as defined in SEPP (AQM)<sup>590</sup>.
879. As indicated in other contexts, the EPA considers that this approach to best practice is misconceived.
880. The definition of MEA is (emphasis added):
- “maximum extent achievable” means a degree of reduction in the emission of wastes *from a particular source* that uses the most effective, practicable means to minimise the risk to human health from those emissions and is at least equivalent to or greater than that which can be achieved through the application of best practice<sup>591</sup>.
881. Further, the explanatory notes to SEPP (AQM) state (emphasis added):
- ... reduction to the maximum extent achievable focuses on what is most effective and practicable *for an individual premises*<sup>592</sup>.

<sup>586</sup> EPA, Assessment report for WA67043, EPA.010.108-R at EPA.010.137-R

<sup>587</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.136-R

<sup>588</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.136-R

<sup>589</sup> See DEA, Outline of Submissions, DGA.450.001 at DGA.450.001 (paragraph 1(b)), DGA.450.015 (paragraph 62); DEA, Further Particulars - Statement of Grounds, 5 August 2011, DEA.460.014 (section 1)

<sup>590</sup> DEA, Further and Better Particulars, DEA.460.019 (paragraph 1(a))

<sup>591</sup> SEPP (AQM), EPA.050.050 at EPA.050.065

<sup>592</sup> SEPP (AQM), EPA.050.050 at EPA.050.092

882. Accordingly, the EPA submits that, in the context of a works approval application, the SEPP (AQM) requires consideration of alternative or additional means of reducing the emission of class 3 indicators for a specific proposal. It does not contemplate refusal of any process generating class 3 indicators on the basis that an alternative and completely different proposal would not generate them.

### *Mercury emissions*

883. The same applies to the similar claims DEA makes with respect to mercury emissions (i.e. that determining best practice requires comparison against the emissions from electricity generated from renewable energy sources)<sup>593</sup>.

884. Other than contending that Dual Gas should use a fundamentally different technology for the generation of electricity, DEA has not identified any alternative or additional techniques, methods, process or technology that would reduce mercury emissions from the DGDP.

### *Design criteria*

885. The design criteria in SEPP (AQM) for emissions class 3 indicators and mercury are:

- (a) arsenic - 0.00017 mg/m<sup>3</sup> averaged over a 3 minute period;
- (b) beryllium - 0.000007 mg/m<sup>3</sup> averaged over a 3 minute period;
- (c) cadmium - 0.000033 mg/m<sup>3</sup> averaged over a 3 minute period;
- (d) nickel - 0.00033 mg/m<sup>3</sup> averaged over a 3 minute period;
- (e) silica - 0.00033 mg/m<sup>3</sup> averaged over a 3 minute period; and
- (f) mercury (inorganic) - 0.0033 mg/m<sup>3</sup> averaged over a 3 minute period<sup>594</sup>.

886. The EPA accepts the emission rates and modelling of the likely emissions of class 3 indicators set out in the Works Approval Application<sup>595</sup> and Dual Gas's Briefing Note on Mercury Emissions<sup>596</sup>.

887. The EPA is satisfied that the DGDP will add only small amounts to the ground level concentrations of class 3 indicators and mercury, and that the emission of class 3 indicators and mercury will not exceed the design criteria in the SEPP (AQM)<sup>597</sup>.

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<sup>593</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.020 (paragraphs 1(b)-(c))

<sup>594</sup> SEPP (AQM), EPA.050.050 at EPA.050.068 and EPA.050.072-073

<sup>595</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.628 (appendix F)

<sup>596</sup> Dual Gas, Briefing Note – Mercury, EPA.010.027-R at EPA.010.030-R-033-R

<sup>597</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.136-R

## 19.3 DEA's Grounds of Review

### ***Failure to apply best practice management to the emissions of "toxic compounds" and/or to reduce emissions to the maximum extent achievable***

888. The EPA's response to this ground is set out above.

### ***The principle of intergenerational equity has not been properly applied in the assessment of health impacts of "toxic compounds"***

889. DEA clarified in its Further and Better Particulars that when referring to "toxic compounds" in this context it means mercury<sup>598</sup>.
890. DEA contends that because mercury can bio-accumulate along the food-chain and minute amounts can cause adverse health effects, any emission amount can potentially adversely affect future generations. Therefore, all efforts to reduce its release into the environment must be taken<sup>599</sup>.
891. On this basis DEA contends that, as there are viable alternatives for base load electricity generation in Victoria, the DGDP should not be granted works approval, in either the 300MW or 600MW configurations<sup>600</sup>.
892. With regard to the principle of intergenerational equity, there is no evidence that the level of mercury emitted from the DGDP would impact significantly on the maintenance of "the health, diversity and productivity of the environment" for the benefit of future generations.
893. Further, Schedule A of SEPP (AQM) states that the reason for classification of mercury as a class 2 indicator is "bioaccumulation", which indicates that the risk of bioaccumulation was specifically considered when setting the design criterion for mercury<sup>601</sup>.
894. The EPA is satisfied that the mercury emissions from the DGDP would not be contrary to the principle of intergenerational equity.

## 20 Noise

### 20.1 Dual Gas's Grounds of Review

895. Dual Gas is seeking a review of conditions 2.6, 2.7 and 3.1 (b) of the Works Approval on the following grounds<sup>602</sup>:

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<sup>598</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.028 (paragraph 5(c))

<sup>599</sup> DEA, Further and Better Particulars, DEA.460.019 at DEA.460.020 (paragraph 2(a)(iii))

<sup>600</sup> DEA, Outline of Submissions, DEA.450.001 at DEA.450.016 (paragraph 68)

<sup>601</sup> SEPP (AQM), EPA.050.050 at EPA.050.068

<sup>602</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.013-14 (paragraphs 6, 8)

- Ground 6(a): the noise design targets are not in accordance with SEPP N-1;
- Ground 6(b): the noise mitigation measures necessary to meet the noise design targets will affect the economic viability of the project and increase the per unit cost of electricity production;
- Ground 6(c): the noise mitigation measures necessary to meet the design targets do not advance the ESD principles (Dual Gas has confirmed that this is based on ‘amongst other things, the principle of integration of economic, social and environmental considerations’<sup>603</sup>); and
- Ground 6(d): the noise design targets should be as specified in the SKM Final Noise Assessment.

896. These four grounds can be addressed in two parts:

897. Firstly, Dual Gas’s claims that the noise design targets in the Works Approval are not appropriate (grounds 6(a) and 6(d)). These “targets” differ from the noise limits and are set by the EPA under the guidance of NIRV.

898. Secondly, Dual Gas’s claims that the noise mitigation measures to achieve the noise design targets in the Works Approval are not economically feasible (grounds 6(b) and 6(c)).

## 20.2 Common Ground

899. Both Dr Broner (on behalf of Dual Gas) and Mr Nancarrow (on behalf of the EPA) gave written evidence on the noise impacts from the DGDP, most recently in the Joint Expert Report.

900. In the Joint Expert Report, Mr Nancarrow and Dr Broner agreed that:

- NIRV (along with its associated guide and explanatory notes) applies to the DGDP<sup>604</sup>.
- Morwell (including the noise sensitive areas at 46 McLean St, Morwell, 22 McMillan St Morwell and 46 Wallace St<sup>605</sup>) is a Major Urban Area under NIRV<sup>606</sup>.
- Because the noise sensitive areas are located in a Major Urban Area, recommended maximum noise levels at those areas should be determined in accordance with SEPP N-1<sup>607</sup>.

<sup>603</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.031 (paragraph 10(a))

<sup>604</sup> Broner and Nancarrow, joint expert report, 4.1; NIRV, EPA.050.1466; EPA, *SEPP N-1 and NIRV Explanatory Notes* (Publication No. 1412) (**NIRV Explanatory Notes**), EPA.050.1481; EPA, Applying NIRV, EPA.050.1516

<sup>605</sup> It is also agreed that these are suitable reference locations to assess the impacts of noise from DGDP: Broner and Nancarrow, joint expert report (section 4.5)

<sup>606</sup> Broner and Nancarrow, joint expert report (section 1.11)

<sup>607</sup> Broner and Nancarrow, joint expert report (sections 1.11-1.12)

- The noise limits for the noise sensitive areas (calculated in accordance with SEPP N-1) are<sup>608</sup>:

	Day period	Evening period	Night period
46 McLean St, Morwell	50 dB(A)	44 dB(A)	39 dB(A)
22 McMillan St, Morwell	51 dB(A)	47 dB(A)	43 dB(A)
46 Wallace St, Morwell	53 dB(A)	47 dB(A)	42 dB(A)

- Subsection 2.2 of NIRV and section 5 of the Applying NIRV provide guidance on how noise from multiple industry contributors should be accounted for<sup>609</sup>.
- NIRV requires Dual Gas to design the DGDP to ensure that it can meet noise design targets that are at or below the noise limits depending on the assessed likelihood of multiple industry contributors<sup>610</sup>.
- If it is necessary to account for multiple industry contributors, the noise design targets should be determined as follows<sup>611</sup>:

If there are two industrial activities contributing the same amount of noise at a sensitive noise area, the noise design target for each activity should be 3 dBA lower than the noise limit.

If there are three industrial activities contributing the same amount of noise at a sensitive noise area, the noise design target for each activity should be 5 dBA lower than the noise limit.

If there are more than three significant noise contributors then the noise design target would be lower still.

- The DGDP can be designed to comply with the noise design targets that are currently specified in the Works Approval (although the practicability of meeting those targets is not agreed between the experts).<sup>612</sup>.

901. There remain two points of disagreement between the experts:

- (a) the amount by which the noise design target should be below the noise limit; and
- (b) the practicability of meeting the noise design targets set in the Works Approval.

902. These two points of disagreement match closely with the two broad grounds on which Dual Gas seeks review of the noise conditions. Both of these points, including further details about the experts' opinions, are addressed below in turn.

<sup>608</sup> Broner and Nancarrow, joint expert report (section 4.7)

<sup>609</sup> Broner and Nancarrow, joint expert report (sections 1.14-1.18)

<sup>610</sup> Broner and Nancarrow, joint expert report (section 4.2)

<sup>611</sup> Broner and Nancarrow, joint expert report (sections 4.8-4.11)

<sup>612</sup> Broner and Nancarrow, joint expert report (sections 5.11-5.12)

903. As previously discussed, Dr Broner's position on (a) depends on a particular interpretation of the standing of clause 18 of SEPP N-1 which is a legal matter and is discussed in section 8.2. The EPA has no doubt that Dr Broner's position on this is incorrect.

### **20.3 The appropriate 'penalty' to be applied to the noise limits (Grounds 6(a) and 6(d))**

904. As noted in section 8.2 above, subsection 2.2 of NIRV provides that a site may need to meet lower noise levels when more than one industry contributes *or will contribute* to the total noise level affecting a noise sensitive area (our emphasis)<sup>613</sup>.

905. In order to determine the extent to which the noise level should be lowered in Major Urban Areas to account for multiple industry contributors, decision makers are referred to Appendix F of the SEPP N-1 and NIRV Explanatory Notes<sup>614</sup>. The explanatory notes state<sup>615</sup>:

The following is a guide for applying these requirements where there are multiple current or anticipated noise sources in an area...

New individual noise sources should be chosen, sited or abated so that the noise contribution is 10-15 dB below the noise limit.

New industries, plant expansion or major new sources should be abated to: noise limit  $-10 \times \log_{10}(N)$  in decibels at the noise-sensitive area (for each period of the day), where N is the total number of existing and likely contributing industrial installations.

906. The EPA accepts that the DGDP is a "new industry", not a "new individual noise source", and therefore the applicable formula is: *noise limit  $-10 \times \log_{10}(N)$*  in dB(A) at the noise-sensitive area.

907. Therefore, in order to calculate the appropriate noise limit 'penalty', it is necessary to determine the total number of existing and likely contributing industrial installations (including the new proposal).

#### ***Existing noise emitters***

908. A number of significant industries currently operate in the vicinity of the noise sensitive areas in Morwell, including Energy Brix, Mecrus and Australian Char.

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<sup>613</sup> NIRV, EPA.050.1466 at EPA.050.1470 (subsection 2.2)

<sup>614</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1531 (section 5)

<sup>615</sup> EPA, NIRV Explanatory Notes, EPA.050.1481 at EPA.050.1513 (Appendix F)

909. EPA noise measurements have confirmed that Energy Brix is contributing to noise levels at McMillan Street. David Guy from the EPA recorded clear noise levels from Energy Brix of LAeq 45 and 45 dB(A) with a breeze from the south west<sup>616</sup>.
910. Further, Mr Nancarrow has advised that the unattended noise monitoring conducted by the EPA at 8 McMillan Street at the beginning of December 2011 included audio recordings “which reveal (at some times) continuous noise consistent with industrial contributions and identifiable steam release type noise consistent with the observations near to Energy Brix”<sup>617</sup>.
911. Although Mr Nancarrow and Dr Broner agree that no noise from industry was audible during the attended noise observations at McMillan Street on 7 December 2011, they also agree that it was not expected that noise from Energy Brix and other industrial plants in the area (Mecrus and Aus Char) would be audible given the weather conditions at the time. It is important to note that, as background noise level measurements are not valid if they include industrial noise, every effort is made to take background noise measurements in conditions when industrial noise is unlikely to occur<sup>618</sup>.

### ***Likely noise emitters***

912. There are large parcels of industrial-zoned land (including SUZ1 and Industrial 1) in the vicinity of the DGDP site that are not yet developed.
913. These parcels of land are in fact closer to the noise sensitive residential areas in Morwell than the DGDP.
914. Although specific future industries that may occupy that area are not known, the planning intent of the area makes at least three simultaneous existing and future noise contributors likely.
915. In this context, Mr Nancarrow considers that there are at least two other current or potential noise contributors at the noise sensitive areas in McMillan St, McLean St and Wallace St (ie at least three existing and likely noise contributors in total)<sup>619</sup>.
916. Applying the formula in Appendix F the SEPP N-1 and NIRV Explanatory Notes, the appropriate noise limit ‘penalty’ to apply is  $10 \times \log_{10}(3)$  which equals 4.77 decibels rounding to 5 dB(A).
917. The EPA submits that this means that Dual Gas should be required to design the DGDP to meet a noise level at McMillan St, McLean St and Wallace St that is 5 dB(A)

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<sup>616</sup> Broner and Nancarrow, joint expert report (section 5.6); Nancarrow, expert witness statement by way of reply, EPA.100.519 at EPA.100.527 (section 3, paragraph 3); Nancarrow, expert witness statement, EPA.100.269 at EPA.100.280 (paragraph 72)

<sup>617</sup> Broner and Nancarrow, joint expert report (section 5.6)

<sup>618</sup> Nancarrow, expert witness statement, EPA.100.269 at EPA.100.276-277 (paragraph 56)

<sup>619</sup> Broner and Nancarrow, joint expert report (section 5.4)

lower than the relevant noise limit. This is needed in order to ensure that Dual Gas, in combination with other noise emitters, will not exceed the noise limits at the noise sensitive areas.

### ***Dual Gas's position***

918. In the Joint Expert Report, Dr Broner stated that he is of the opinion that the noise design target should be a maximum of 3 dB(A) less than the noise limit<sup>620</sup>. It appears that Dr Broner considers that there is or is likely to be no more than one other significant noise contributor (other than the DGDP) at the noise sensitive areas in Morwell.
919. The EPA notes that, in his expert witness statement, Dr Broner acknowledged that some plant noise was audible at the McMillan St assessment point, and therefore “consideration for the presence of another plant which is contributing to the total effective noise level should be given”<sup>621</sup> depending on whether temperature inversions occur for the majority of the year and on whether Hazelwood Power Station is the source and will continue to operate in the future.
920. It is not clear whether Dr Broner has taken that noise source to be the one ‘other’ noise contributor (and therefore has not catered at all for the future use of the industrially zoned land in the vicinity of the DGDP).
921. Also, it is not clear whether Dual Gas will continue to argue that no noise ‘penalty’ should be imposed on the noise limit to cater for multiple existing and likely contributing industrial installations (the position taken in SKM’s Final Noise Assessment).
922. It is not clear whether Dr Broner has attempted to observe the impact of existing industrial noise in the Morwell residential areas under weather conditions favourable to observing such contributions (that is southerly winds). Therefore, the EPA submits that his claim of at most one existing contributor (possibly the Hazelwood power station) is not fully informed.

## **20.4 Economic implications (grounds 6(b) and 6(c))**

923. Dual Gas also seeks review of the noise conditions on the basis that the noise mitigation measures required to meet the noise design targets (**the mitigation measures**)<sup>622</sup>:
- will affect the economic viability of the project;
  - will increase the per unit cost of electricity production; and

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<sup>620</sup> Broner and Nancarrow, joint expert report (section 5.4)

<sup>621</sup> Broner, expert witness statement, DGA.200.001 at DGA.200.010-011 (paragraph 14)

<sup>622</sup> Dual Gas, Application for review in P1829/2011, DGA.260.008 at DGA.260.013-14 (paragraphs 6, 8)

- do not advance the principle of integration of economic, social and environmental considerations<sup>623</sup>.

924. There appears to be no argument that it is possible for the DGDP to meet the noise design targets - in the Joint Expert Report, Mr Nancarrow and Dr Broner agreed that the mitigation measures would be feasible<sup>624</sup>.

925. This is also evident from the technical memorandum prepared by Hessler Associates for SKM titled 'Noise Level Performance Feasibility', which was quoted in the Joint Expert Report. Mr Hessler, an acoustic consultant in the USA who has considerable experience in the control of noise from power plants, compared the DGDP to a similar facility and concluded that the noise design targets can be met technically<sup>625</sup>:

It is shown by measurements from a very similar facility that a 230 MW sized CCGT plant with extensive noise abatement including noise barriers around the HRSG and accessory skids would result in levels around 10 dBA below the requirements of the HRL project. An HRSG open top approach may not be required, but, it may be concluded with good certainty that the HRL project requirements can be technically met with attentive acoustic design.

926. However, whilst Mr Nancarrow concluded that the mitigation measures are practicable, Dr Broner found that they "may be impracticable in terms of the cost relative to the environmental improvement they offer"<sup>626</sup>.

***Will the mitigation measures have an impact on the economic viability of the DGDP and/or the per unit cost of electricity production?***

927. Dual Gas's preliminary estimate of the cost of the mitigation measures is approximately \$10 million<sup>627</sup>. Dual Gas has stated that it is not able to provide a more certain estimate.

928. Dual Gas has not provided any evidence to substantiate its claim that the mitigation measures would cost in the region of \$10 million, or that this cost would have an impact on the economic viability of the DGDP or the per unit cost of electricity production.

929. Assuming that \$10 million is an accurate cost estimate, and even at Mr Walton's lowest estimated total DGDP cost of \$1,218 million for the 600MW DGDP and \$749 million for

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<sup>623</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.031 (paragraph 10(a))

<sup>624</sup> Broner and Nancarrow, joint expert report (sections 5.11-5.12); Nancarrow, expert witness statement, EPA.100.269 at EPA.100.269 (paragraph 4)

<sup>625</sup> Broner and Nancarrow, joint expert report (section 5.10) quoting from the Hessler Report, EPA.010.001-R at EPA.010.016-R

<sup>626</sup> Broner and Nancarrow, joint expert report (section 5.11)

<sup>627</sup> Dual Gas, Further and Better Particulars, DGA.260.028 at DGA.260.031 (paragraph 9(b))

the 300MW DGDP<sup>628</sup>, the cost of mitigation measures is not more than 0.8% of the total project cost for the 600MW DGDP or 1.3% of the total project cost for the 300MW DGDP. Given that it is accepted that the 300MW DGDP will produce less noise than the 600MW, it is likely to be an even smaller percentage for the 300MW DGDP.

930. The EPA submits that a maximum increase of approximately 1.3% in capital cost could not reasonably be found to materially affect the economic viability of the project or increase the per unit cost of electricity production. As previously noted, the project is in any event not economically viable without government and other support.

***Are the current noise design targets inconsistent with the principle of integration of economic, social and environmental considerations?***

931. As discussed in section 13.5 above, the principle of integration of economic, social and environmental considerations is directed to the public interest in sound environmental practices and procedures. Economic and social development are aspects of the common good that may or may not be served by protecting individual developers from the financial costs of measures to mitigate impacts on the environment of their development.
932. In this situation, other economic considerations arise aside from the cost of the mitigation measures for Dual Gas. In particular, there are significant parcels of industrial-zoned land (including the special use zones for industry and coal mining) within the vicinity of the DGDP site. In order to preserve the use of that land for its intended purpose, Dual Gas should not be permitted to take the whole noise limit allowance at the sensitive noise receptors.
933. The EPA submits that the need to protect the industrially zoned land from sterilisation far outweighs the relatively small financial cost to Dual Gas of the mitigation measures (when considered in the context of the cost of the DGDP as a whole).

**20.5 The restrictions on allowing recommended noise levels to be exceeded**

934. Under NIRV, if a proposal will not be able to achieve recommended noise levels in a Major Urban Area, generally the decision maker should not approve the proposal. The exception is where the decision maker is satisfied that rural infrastructure or resource-based constraints mean the recommended levels cannot be met.

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<sup>628</sup> Mr Walton estimated that gross capital cost for the 600MW DGDP would be "materially less than \$1,740 million", and for the 300MW DGDP, materially less than \$1,070 million. Mr Walton said that by materially less he meant 10 – 30% lower. Therefore, the lowest cost estimate is 30% less than \$1,740 million (\$1,218 million for the 600MW DGDP) and \$1,070 million (\$749 million for the 300MW DGDP): see paragraphs 569-572 above

935. Section 4.2 of Applying NIRV<sup>629</sup> provides that, before deciding whether to approve an industry proposal, the decision maker should satisfy itself that the industry has<sup>630</sup>:
- reduced noise as far as practicable;
  - demonstrated a net benefit for the proposal;
  - explored alternative outcomes with the community to address the noise risks; and
  - proposed measures to address the residual noise risks.
936. This section applies primarily to Rural Areas but is considered to apply where rural infrastructure or resource based constraints affect compliance in Major Urban Areas.
937. Although Dual Gas has not provided any evidence that rural infrastructure or resource-based constraints mean the recommended levels determined in accordance with NIRV cannot be met, the EPA has assessed whether Dual Gas would satisfy the above requirements, as follows.

***Has Dual Gas reduced noise as far as practicable?***

938. As outlined above, given the proportionate cost of the mitigation measures to the total project cost, the EPA submits that it is practicable for Dual Gas to meet the noise design targets.
939. The EPA's submission is supported by Mr Nancarrow.
940. In order to assess the practicability of complying with the noise design targets, Mr Nancarrow compared the sound power levels of the DGDP with other projects of a comparable scale (Mortlake and Shaw River power stations) and determined that both comparison power stations have sound power levels of 112dB(A) (the implied plant sound power level required for the DGDP to meet the noise design targets). Whilst Mortlake power station has a 500MW total (open cycle) and Shaw River has a 1500MW total (combined cycle), both have a total sound power level of 112dB(A)<sup>631</sup>.
941. In Mr Nancarrow's expert opinion<sup>632</sup>:

[b]ased on the material submitted by Dual Gas in the Hessler report (as one option for an acoustic design), comparison with other projects of a similar scale and my own understanding of noise control options, I consider that noise control to meet the noise design targets in the Works Approval is feasible.

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<sup>629</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1525

<sup>630</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1525

<sup>631</sup> Nancarrow, expert witness statement, EPA.100.269 at EPA.100.288-289 (paragraphs 123-126)

<sup>632</sup> Nancarrow, expert witness statement, EPA.100.269 at EPA.100.290 (paragraph 130)

***Has Dual Gas explored alternative outcomes with the community to address the noise risks?***

942. This requires Dual Gas to involve affected parties and the broader community in order to identify the potential positive and negative impacts and the available management measures to address the residual noise risk<sup>633</sup>.
943. Part 4.3 of the Works Approval Application addresses the Community engagement undertaken by Dual Gas<sup>634</sup>. There is no evidence that residual noise risk has been addressed in consultations. Nor has there been any presentation of information for parties to consider the net benefit or disbenefit of the project in relation to the magnitude of the impact of residual noise risk.

***Has Dual Gas proposed measures to address the residual noise risks?***

944. Applying NIRV<sup>635</sup> provides that a proponent who cannot meet the recommended noise levels must document the residual noise risks, including the degree to which the recommended levels would be exceeded, the frequency of exceedance, how many locations are exposed, and the time of day when exceedances would occur at each noise-sensitive area.
945. The proponent must also document all further possible measures to reduce the noise or its impact, with assessment of the noise reduction it offers and its effect on the viability of the project. This includes considering changing the duration of activities, limiting hours or avoiding noise during more sensitive periods, and reducing or substituting certain noisy activities.
946. Dual Gas has not provided this information.

**20.6 Conclusion**

947. In light of the number of existing noise contributors and the number of large undeveloped parcels of industrial-zoned land in the vicinity of the DGDP, the EPA submits that there are or will be at least two other noise contributors at the noise sensitive areas in McMillan St, McLean St and Wallace St.
948. This means that, in accordance with NIRV, Dual Gas should be required to design the DGDP to meet a noise level at McMillan St, McLean St and Wallace St that is 5 dB(A) lower than the relevant noise limit. This is needed in order to ensure that Dual Gas, in combination with other noise emitters, will not exceed the noise limits at the noise sensitive areas.

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<sup>633</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1525 (section 4.2)

<sup>634</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.327-328

<sup>635</sup> EPA, Applying NIRV, EPA.050.1516 at EPA.050.1525 (section 4.2)

949. Although Dual Gas has claimed that the cost of the noise mitigation works needed to achieve the noise design targets is approximately \$10 million, Dual Gas has not provided any evidence to substantiate that claim or that this cost would have an impact on the economic viability of the DGDP or the per unit cost of electricity production.
950. The EPA submits that this cost could not reasonably be found to materially affect the economic viability of the project or increase the per unit cost of electricity production.
951. Further, the EPA submits that the need to preserve the use of the currently undeveloped industrially zoned land in the vicinity of the DGDP for its intended purpose far outweighs the relatively small financial cost to Dual Gas of the mitigation measures (when considered in the context of the cost of the DGDP as a whole).
952. Finally, the EPA submits that Dual Gas has not provided any or sufficient evidence to satisfy the Tribunal that it should be entitled to exceed the recommended noise levels calculated under NIRV (and thereby either cause the noise limits at the noise sensitive areas to be exceeded or prevent new noise emitters from being establishing in the area).

## 21 Other Relevant Project Impacts

### 21.1 Solid waste

953. Dual Gas has indicated that the DGDP (at 600MW with two gasifiers operating at 85% capacity) would generate a number of wastes which may be classified as prescribed industrial wastes under the *Environmental Protection (Industrial Waste Resource) Regulations 2009 (Industrial Waste Resource Regulations)*, being:
- (a) approximately 40,000 tonnes per annum of fly ash from the char burners;
  - (b) approximately 25,000 tonnes per year of ammonium sulfate and ammonium chloride salts from the syngas-clean up system, which cleans ammonia from the syngas stream;
  - (c) small amounts of other industrial wastes (e.g. solvents, chemicals, resins, and waste oil)<sup>636</sup>.
954. Dual Gas proposes to dispose of the fly ash by sluicing with water into the adjacent Hazelwood Ash Pond, under an agreement with International Power Hazelwood<sup>637</sup>.
955. Dual Gas proposes to recover ammonium sulfate and ammonium chloride salts by concentration and crystallisation, and to sell these for commercial use<sup>638</sup>. Dual Gas

<sup>636</sup> EPA, Assessment Report WA 67043, EPA.010.108-R at EPA.010.147-R (section 6.6); Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.370 (section C1)

<sup>637</sup> EPA, Assessment Report WA 67043, EPA.010.108-R at EPA.010.147-R (section 6.6); Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.354 (section 6.3)

- only proposes to dispose of such waste if beneficial reuse is not possible and has stated that it will do so in accordance with the Industrial Waste Resource Regulations using EPA licensed contractors<sup>639</sup>.
956. Small quantities of other industrial wastes would be disposed of by EPA licensed waste transporters as required by the Industrial Waste Resource Regulations<sup>640</sup>.
957. Dual Gas has stated that it expects that the quantities of general solid wastes (e.g food waste and recyclables, including glass, plastics, aluminium, paper, cardboard, scrap metals and wood) from the DGDP would be minimal, and that these wastes would be transported off-site by EPA licensed contractors<sup>641</sup>.
958. The EPA is satisfied that the measures proposed by Dual Gas to manage, transport and dispose of the industrial wastes from the DGDP are appropriate and that Dual Gas would be able to comply with the Industrial Waste Resource Regulations.
959. Although DEA has raised concerns about the fly ash generated by the DGDP<sup>642</sup>, it has not advanced any arguments as to how such emissions fail to comply with applicable legislation or policies.

## 21.2 Surface water discharges

### *Stormwater*

960. The DGDP would result in an increase in stormwater run-off due to the increase in impervious surface at the site<sup>643</sup>.
961. Dual Gas proposes to continue to discharge stormwater from the site into the adjacent Energy Brix settling pond, under an agreement with EBAC. EBAC holds an EPA licence to discharge stormwater into Bennetts Creek. Recent annual performance reports indicate that EBAC is complying with licence limits and that the water quality in Bennetts Creek is not adversely affected by the discharge<sup>644</sup>.
962. As increased sediment is expected during construction, the Works Approval requires Dual Gas to prepare a management plan for stormwater which must include a sediment flocculation pond upstream of the Energy Brix settling pond (condition 3.2 (b))<sup>645</sup>. This is to reduce the load on the Energy Brix settlement pond during construction of the DGDP<sup>646</sup>.

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<sup>638</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.354 (section 6.3)

<sup>639</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.147-R (section 6.6); Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.355 (section 6.4)

<sup>640</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.355 (section 6.4)

<sup>641</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.354 (section 6.3)

<sup>642</sup> DEA, Outline of Submissions, DEA.450.001 at DEA.450.015-016 (paragraphs 62-67)

<sup>643</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.148-R (section 6.6.2)

<sup>644</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.148-R (section 6.6.2)

<sup>645</sup> EPA, Works Approval WA 67043, EPA.020.285 at EPA.020.290

<sup>646</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.148-R (section 6.6.2)

963. On this basis, the EPA is satisfied that the stormwater run-off arising as a result of the DGDP (at 300MW or 600MW) would comply with SEPP (Waters of Victoria). No party to these proceedings has disputed this aspect of the EPA's assessment of the DGDP.

### ***Saline wastewater***

964. The DGDP (at 600MW) would generate approximately 80 kl/day of saline wastewater<sup>647</sup>.

965. Dual Gas proposes to discharge the saline wastewater from the DGDP into the existing Regional Saline Waste Outfall Pipeline system, which is used by all Latrobe Valley coal-fired power stations. Saline wastewater from the system is discharged into Bass Strait under an EPA licence held by Gippsland Water<sup>648</sup>.

966. The EPA considers that this discharge would not cause an unacceptable risk to the environment or result in a breach of the licence held by Gippsland Water, as the additional saline wastewater from the DGDP would add less than 1% to the volume of saline wastewater discharged under this licence and is of the same quality as existing saline wastewater from the Hazelwood and Energy Brix power stations<sup>649</sup>.

967. On this basis, the EPA is satisfied that the discharge of saline wastewater from the DGDP (at 300MW or 600MW) would comply with SEPP (Waters of Victoria).

968. No party to these proceedings has disputed this aspect of the EPA's assessment of the DGDP.

## **21.3 Contamination of groundwater and land**

969. Neither waste nor wastewater streams from the DGDP are proposed to come into contact with land. In addition all facilities storing environmentally hazardous substances would be fully banded<sup>650</sup>.

970. The EPA considers that it is unlikely that the DGDP (at 300MW or 600MW) would result in significant discharges of waste which would impact on the beneficial uses of land or groundwater.

971. On this basis, the EPA is satisfied that the DGDP would comply with the SEPP (Groundwaters of Victoria) and SEPP (Prevention and Management of Contamination of Land).

972. No party to these proceedings has disputed this aspect of the EPA's assessment.

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<sup>647</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.149-R (section 6.6.3)

<sup>648</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.149-R (section 6.6.3)

<sup>649</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.149-R (section 6.6.3)

<sup>650</sup> EPA, Assessment Report for WA67043, EPA.010.108-R at EPA.010.149-R (section 6.6.4)

## 21.4 Transportation emissions

973. Dual Gas has assessed the GHG emissions from transport necessary for the construction of the DGDGP to be approximately 450 tCO<sub>2</sub>-e<sup>651</sup> and the GHG emissions from the DGDGP's small vehicle fleet to be 25 tCO<sub>2</sub>-e per annum<sup>652</sup>. The EPA considers that these amounts are insignificant in the context of the overall GHG emissions of the DGDGP and that they do not need to be separately assessed.
974. There will also be GHG emissions resulting from the transport of coal to the site. Dual Gas has said in the Works Approval Application that it expects to source coal for the DGDGP by conveyor from the adjacent Morwell coal field<sup>653</sup>. However, Dual Gas has noted that coal may be sourced from the Yallourn North Extension coal field at some point in the future, which would require transportation via road<sup>654</sup>.
975. Dual Gas has calculated the Full Fuel Cycle GHG emissions of the DGDGP, which includes both direct (scope 1) and indirect (scope 3) emissions, and therefore also includes indirect GHG emissions arising from the transportation of coal. These calculations indicate that the addition of all indirect emissions only increases the total GHG emissions of the DGDGP by 1.6% to 2% for Cases 1-3. The figure for Case 4 is higher (8.2%) due to the significantly lower total amount of GHG emissions of the DGDGP operating only on natural gas<sup>655</sup>. As transportation emissions are only part of the scope 3 emissions attributable to the operation of the DGDGP, these emissions would account for less than the 1.6% to 2%, and 8.2%, figures.
976. The EPA considers that the transportation emissions attributable to the DGDGP are comparatively insignificant in the context of the wider DGDGP and that they do not need to be separately assessed.

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<sup>651</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.556 (section 6.4.2)

<sup>652</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.557 (section 6.4.4)

<sup>653</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.464 (section 1)

<sup>654</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.349 (section 5.5.3.3)

<sup>655</sup> Dual Gas, Works Approval Application, EPA.020.292 at EPA.020.558 (section 6.5, table 6-6)

## Part H The Works Approval

### 22 Without Prejudice Revisions to the Works Approval

## 23 Commentary on Proposed Revisions

### 23.1 Plan of the Works

977. The Works Approval has been updated to include reference to a Plan of the Works, as suggested by the Tribunal.
978. The EPA has proposed amendments to the Works Approval to require Dual Gas to construct the works in accordance with the Plan of the Works, and for the plans that must be submitted under condition 3.1 to be generally in accordance with the Plan of the Works.

### 23.2 Condition 1.4

979. Condition 1.4 has been added to provide that the Works Approval will not take effect until any required planning permit has been issued.

### 23.3 Condition 1.5

980. In response to the Tribunal's question regarding commissioning, the EPA has proposed a new condition to confirm that the Works Approval does not authorise commissioning that may lead to the discharge of waste and that approval for any such commissioning must be obtained under section 30A of the EP Act. As a commissioning plan must be submitted as part of the approval under section 30A, the EPA proposes to delete condition 3.3.

### 23.4 Condition 2.1

981. Condition 2.1 requires the plant to be designed in a manner which enables it to operate at a GEI of 0.8 tCO<sub>2</sub>-e/MWh to the satisfaction of the EPA. The EPA has proposed a minor change of wording in this condition.
983. Given that the condition is about the design – rather than operation – of the plant, it is considered appropriate to require the plant to be *designed* to enable compliance on the more onerous “as sent out” basis, which would enable it to comply operationally with either standard as specified in the licence. The substantive difference between “as generated” and “as sent out” is addressed in sections 11.5 and 14.2 of these submissions.

### **23.5 Condition 2.3(a)**

984. The Tribunal has noted that although the Works Approval Application specified heights for the various stacks on-site, the application indicates that these may be reduced in consultation with the EPC contractor.
985. The EPA has assessed the DGDP on the basis of the stack heights and diameters included in the Works Approval Application and its intention in imposing condition 2.3(a) was to require Dual Gas to construct the stacks accordingly.
986. Therefore, the EPA has updated condition 2.3(a) to refer to the stack heights and diameters provided by Dual Gas in the Works Approval Application, with the ability to vary those heights and diameters with the EPA's approval in the report to be prepared under condition 3.1.

### **23.6 Condition 2.6**

987. The Deputy President queried why condition 2.6 refers to "noise design targets" rather than "limits".<sup>656</sup> The answer is that the terminology is deliberate in order to distinguish the policy term "noise limit" (at the noise sensitive areas) from the site-specific "design targets" which take account of the multiple noise sources impacting, or potentially impacting, on those areas. Accordingly, no change in wording is proposed.

### **23.7 Condition 2.7**

988. This condition has been updated to reflect the 1dB(A) increase in the night period noise limit at 22 McMillan St, Morwell, that has been agreed between the EPA's and Dual Gas's noise experts.

### **23.8 Condition 2.9**

989. This condition required Dual Gas to provide 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. This requirement was repeated in condition 3.1(d). Therefore, condition 2.9 has been deleted.

### **23.9 Condition 3.1(a)**

990. Condition 3.1(a) requires the detailed plans and specifications which are to be submitted for EPA approval prior to construction to make provision for the installation of SO<sub>2</sub> reduction equipment. In his statement in response to Mr Tsesmelis's expert witness statement, Mr Blatchford queried the amount of SO<sub>2</sub> reduction that is required under this condition. The condition has been updated to clarify that it requires an overall sulfur capture rate of at least 90% of uncontrolled emissions.

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<sup>656</sup> DP Dwyer, opening submissions, P358 L5-7

### **23.10 Condition 3.1(c)**

991. Condition 3.1(c) requires the detailed plans and specifications which are to be submitted for EPA approval prior to construction to make provision for the future installation of carbon capture equipment. It is proposed that this be clarified as involving determination of the footprint of the equipment needed to capture at least 90% of the CO in the syngas stream and achieve at least a 65% reduction in CO<sub>2</sub> emissions from the plant as a whole and to demonstrate that there is sufficient space not only for the equipment, but to enable its construction and the effective handling of environmental and safety issues.
992. The EPA considers that 90 to 95% pre-combustion capture of CO from the syngas would be achievable. However, as the DGDP includes other sources of CO<sub>2</sub>, the EPA expects that the overall CO<sub>2</sub> removal efficiency would be somewhat less than 90 to 95%. Dual Gas's Works Approval Application states that, with CCS, the GEI of the DGDP would be 0.26 tCO<sub>2</sub>-e/MWh (which the EPA assumes is on an 'as generated' basis). This represents an overall reduction of approximately 64% - 67% from the 0.73 – 0.80 GEI for the DGDP without CCS.
993. Therefore, the EPA considers that it would be reasonable to require Dual Gas to ensure that there is sufficient space on the site to install carbon capture equipment that could capture at least 90% of the CO in the syngas and achieve at least a 65% reduction in CO<sub>2</sub> emissions from the plant as a whole.

### **23.11 If the Tribunal removes condition 3.1(a)**

994. Although the EPA continues to support condition 3.1(a), on a without prejudice basis it has proposed that two new conditions be added if the Tribunal does not accept that SO<sub>2</sub> reduction equipment is required from the outset.
995. The EPA submits that the first new condition is required in order to ensure that the SO<sub>2</sub> emissions from the DGDP are consistent with the levels put forward by Mr Blatchford. Therefore, this condition requires Dual Gas to reject coal that has a sulfur content greater than that assumed by Mr Blatchford in the calculations of SO<sub>2</sub> emission levels that he submitted to the Tribunal during the hearing<sup>657</sup>.
996. As SO<sub>2</sub> reduction equipment would be needed as part of a CCS retro-fit, the EPA submits that Dual Gas should be required to ensure that it has allowed sufficient space on the site for such equipment to be installed in the future. That is the purpose of the second new condition.

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<sup>657</sup> Exhibit D11

## Part I Conclusions

997. The Closing Submissions of the EPA will be orally concluded by Senior Counsel during which he will provide a brief summation, highlighting the pivotal issues which the EPA believes should be the key influences on the Tribunal's final determination. In the course of this summation, any aspects which might require further attention as a consequence of any discourse with the Tribunal during the course of presentation to date of these written Submissions will be addressed.
998. On the basis of the evidence now placed before the Tribunal upon which the EPA relies and the successive EPA Submissions presented, including both the Opening Submissions and these Closing Submissions, the Tribunal is respectfully requested to disallow the respective reviews brought by both Dual Gas and the Third Parties. It is submitted the Tribunal should confirm the EPA decision to issue Works Approval WA67043 to allow the construction of an integrated drying, gasification combined cycle power station with a maximum "sent out" electricity generating capacity of 300MW. As to the final form of the Works Approval, it is submitted that the "marked-up" version distributed by the EPA for the purposes of this closing session of the hearing is to be preferred which, for the reasons explained in the course of these Closing Submissions, incorporates a number of sensible alterations to that which was originally issued.

Simon R Molesworth AM

David J Deller

Wednesday, 1 February 2012