In the matter of the Arbitration Act 1996 and
In the matter of an Arbitration
between
HeatCo Limited . . . . . (Claimant)
and
Gorseley Produce Limited formerly [redacted]Limited
. . . . . (Respondent)

ARBITRATOR'S AWARD
FINAL SAVE AS TO COSTS

This is the Award of Eur Ing Professor Geoffrey Michael Beresford Hartwell, a Chartered Engineer, as sole arbitrator in a reference between HeatCo Limited, an energy provider, of [redacted], and Gorseley Produce Limited, formerly Gorseley Nurseries Limited, a grower of horticultural produce, of [redacted].

PREAMBLE

1 A Contract made on 11 August 1999, between OldHeatCo Limited and Gorseley [redacted] Nurseries for the supply of energy by OldHeatCo (the Contract) includes a provision for arbitration at Clause 20 on page 25, in these terms:

> *20 ARBITRATION*
> *Any dispute under or in connection with this Agreement shall be referred to arbitration by a single arbitrator appointed by agreement or (in default) nominated on the application of either party to the president for the time being of the Institution of Electrical Engineers and any such reference to arbitration shall be deemed to be a submission within the meaning of the Arbitration Acts [sic]1996 or any Act amending or replacing it.*

2 It is common ground between the parties that HeatCo are successors to OldHeatCo Limited for the purposes both of the Contract and of the provision for arbitration.

3 Differences arose between the parties, and HeatCo issued to Gorseley, in a letter dated 24 December 2004, a notice to concur in the appointment of an arbitrator.

4 There having been no agreement as to the appointment of an arbitrator, The President of the Institution of Electrical Engineers, upon the application of HeatCo, appointed me sole arbitrator by an instrument dated 17 January 2005.

5 I accepted the appointment and entered upon the reference by a letter of 24 January 2005, addressed to both parties, making certain enquiries directed to my ascertaining an appropriate procedure.

6 I was advised, by a letter of 1 February 2005, that Messrs Inkwell & Pen, solicitors, of Borocastle, would represent Gorseley. That letter included procedural proposals and closed ". . . . *please may we hear from you by 4 pm on 2nd February 2005. In the absence of a response from you we reserve the right to take steps to preserve our client's position on the arbitration..*" It may be appropriate to note in this context that an arbitrator's duty requires consultation with both parties before he may himself decide upon any course of action, so that this minatory opening by Messrs Inkwell & Pen was apt to create a difficulty.

7 In the subsequent correspondence, Gorseley were invited to raise their purported objections in the Court and had opportunity to do so. In the event, no such proceedings were instituted, but some time had to be dedicated to dealing with the possibility.

8 As I found it impracticable, in the circumstances as they had developed, to complete the procedural arrangements by correspondence, I wrote by e-mail to the parties on 3 February to say that I was minded to call a Preliminary Meeting, and that, Gorseley's objections being as they were, I was minded to make peremptory the Order calling that Meeting.

9 In the event, I was able to make my Order, convening the meeting, by consent. A Preliminary Meeting was held on Thursday, 24 February 2005, at the Spread Eagle Hotel, [redacted]. HeatCo were represented by Mr Mainwaring, their Managing Director, and Gorseley by Mr Tim Martin of Messrs Inkwell & Pen.

10 Directions were given, at the Preliminary Meeting, for the continuation of the Reference.

11 I was advised of the appointment of Messrs Irons Infire, Solicitors of [redacted], London, to represent HeatCo, by an e-mail message dated 3 March 2005.

12 A Hearing took place on Wednesday, 15 June 2005, at the [redacted] Park Hotel, [redacted], [redacted]. Before the Hearing, I was accompanied by the parties and their representatives on an examination of the equipment, the subject of this Arbitration. I thank Gorseley and their team for arranging that visit.

13 At the Hearing, HeatCo were represented by Mr Simon MacCordle, of Counsel, instructed by Mr Jon Fuller of Messrs Irons Infire. Gorseley were represented by Mr Tim Martin of Messrs Inkwell & Pen.

14 All the Witness statements, with the exception of the expert reports, were tendered and accepted without admission.

15 There had been a pleaded issue as to the date of commissioning of the equipment, the subject of the Reference. At the hearing, HeatCo offered, without concession, to accept a date of 1 February 2000 and Gorseley agreed.

16 No witnesses of fact were required, in the event, to give oral evidence. I wish to express my appreciation for those who attended to give evidence but were not called. Perhaps it is apposite, as I record my thanks to them, for me to use the last line of Milton's Sonnet XIX (*On His Blindness*: *When I consider how my light is spent*), *"They also serve who only stand and wait."*

17 The technical experts, Mr Bill Willings, of Bromley, Kent, called by Messrs Irons Infire for HeatCo, and Mr Charles de la Caffré, of Giverny, France, called by Messrs Inkwell & Pen for Gorseley, had filed reports and gave oral evidence at the hearing. There had been some difficulty in the preparation of a joint statement of agreement and disagreement. I had been offered an unsigned draft but, in the light of correspondence between the parties, I decided that it would be best to disregard it, and have done so.

18 I thank Mr Willings and Mr de la Caffré for their help. In view of the possibility that Mr de la Caffré may also have been the "Mr Charles" who made tests for Messrs Enérgie at Gorseley's behest in 2004, I think it right that I should record that I found his evidence of opinion admissible and his opinions to be professional opinions expressed

without regard to the exigencies of Gorseley's case. As an engineer myself, I found both witnesses to be objective in their testimony.

19 It was agreed at the hearing that no post-hearing written submissions would be made. It was also agreed, previous directions notwithstanding, that I reserve my decision as to costs to follow this Award and any representations that may be made; directions for those representations are given in this Award at disposition paragraph 10 of page 21.

20 After the hearing, I prepared an aide-memoire of my understanding of the aspects of Boiler Efficiency which arose in the context of the reference. Although my task is to deliver my decision in accordance with the evidence and the law, I am myself a professional engineer with experience of energy matters and I wished the parties to have an opportunity to deal with the preliminary appraisal I had created in my own mind.

21 I received a reply from Messrs Irons Infire for HeatCo on 13 July 2005. On first examination, I formed the view that Messrs Inkwell & Pen should be given an opportunity to respond, and I so notified Mr Martin (and Mr Fuller) by e-mail that day.

And now I publish this my AWARD, which is FINAL SAVE AS TO COSTS, WITH REASONS as follow:

DISCUSSION

Jurisdiction

22 Neither Party has taken any point on the matter of the succession of HeatCo to the rights and obligations of OldHeatCo Limited under the Contract. Nor has any point been taken as to HeatCo's right to arbitration as successors to OldHeatCo. For completeness, however, I note S.5(5) of the Arbitration Act 1996, which reads:

> *(5) An exchange of written submissions in arbitral or legal proceedings in which the existence of an agreement otherwise than in writing is alleged by one party against another party and not denied by the other party in his response constitutes as between those parties an agreement in writing to the effect alleged.*

23 Even were there to have been issues as to jurisdiction and the intent of the parties to agree to arbitrate, I find on considering the written submissions and the conduct of the Parties in the matter, that the requirements of S5(5) of the Arbitration Act 1996 are met and there is a valid agreement between the parties to submit their differences to

arbitration. For the avoidance of doubt, I find also that I have been correctly nominated and appointed in accordance with the agreement between the parties.

Background

24 Gorseley are a major specialist producer of sweet oranges for UK supermarkets and others. In an internet publication[1] by a journalist, I have seen it said that they are Europe's largest grower of greenhouse oranges. They have a very large expanse of greenhouses on a former [redacted] near Borocastle, in [redacted].

25 HeatCo are a specialist company in the generation and provision of energy by co-generation. Co-generation is a term used for the generation of electricity and useful heat. As mentioned in paragraph 22, HeatCo are successors to OldHeatCo Ltd, whose business also was in co-generation.

26 The Contract between HeatCo and Gorseley (originally a Contract between OldHeatCo Limited and Gorseley) is for the supply of heat to the greenhouse from an installation which includes a number of diesel generators which produce electricity and a number of gas fired boilers. The intention is for the waste heat from the diesel engines to be used for heating in addition to the heat generated in the boilers. An alternative way of putting it would be to say that the boilers are used to generate heat in addition to the waste heat from the diesel generators. In the article referenced at paragraph 24, the author wrote in 2002: *The managing director of Gorseley* [redacted] *Nurseries,* [redacted] *says, "In some ways this is actually a small power station that produces oranges as a by-product of generating clean, efficient electricity".*

27 There is a further benefit for the growing plants. The exhaust gases are washed and delivered into the greenhouse atmosphere in order that an increased Carbon Dioxide level may assist growth by helping the process of photosynthesis.

28 Be that as it may, the Contract between Gorseley and HeatCo is effectively two contracts linked in the same document: one a contract for the supply of electrical energy, the other a contract for the supply of heat by the circulation of heated water, to be measured by heat meters. A heat meter, in this context, comprises a flow meter, measuring the rate of flow of the circulated water, and temperature-measuring probes, one measuring the temperature of the hot water leaving the boiler house and another the temperature of the

1 *http://www.harrison-m.com/feature 8 oranges.htm* - accessed Wednesday, 22 June 2005. Copyright © Mike Harrison 2004 - said to be published in The Planet on Sunday

water returning from the greenhouses. An electronic device calculates the delivery of heat by multiplying the flow rate by the difference in the two temperatures.

29 The dispute between HeatCo and Gorseley is a dispute about the price to be paid by Gorseley for the energy provided. In a sense the whole of the dispute arises from the pricing provision in the Contract at Clause 7 and more particularly at sub-clause 7.6.1, in which is set out a formula for the Price. In view of the importance of that clause in the present reference, I reproduce it in full with its subordinate sub-clause 7.6.1.1

7.6.1 The heat will be supplied at a discounted rate based upon the following data and formula:

Pth = (Pg/Be) - Dr [see footnote 2]

where: Pth = Price per kilowatt hour of heat produced by the boiler
Pg = Price per kilowatt hour of gas consumed by the boiler
Be = the operating efficiency (%) of the boiler
Dr = the agreed discount rate (%)

Under this specific Agreement:
Be = 92.8%
Dr = 23%
Pg = [.....]p/kWh

7.6.1.1 The boiler efficiency mentioned in Sub-clause 7.6.1 shall be subject to annual confirmation starting from the Commissioning Date. Such confirmation will be measured under operating conditions as specified in Schedule 5. If such confirmation shows a variation from the figure in Sub-clause 7.6.1 then the new figure shall become the boiler efficiency for the purposes of Sub-clause 7.6.1 The above process will be repeated annually on the then current figure for boiler efficiency.

30 As Schedule 5 has a direct bearing upon the effect of sub-clause 7.6.1.1, I also set it out here for convenience:

SCHEDULE 5 - OPERATING CONDITIONS AGAINST WHICH BOILER EFFICIENCY IS MEASURED

OldHeatCo Limited
for
Site Location: Gorseley [redacted] Nurseries Limited

Conditions
1 Boiler operating on full load.
2 Ambient air temperature at or below 25 degrees centigrade.

2 **Arbitrator's note:** This formula cannot be intended as it is written. Clearly, to make commercial sense, the discount to be subtracted must be a percentage of the Price. A more correct expression would be Pth = (Pg/Be)x(1-Dr), meaning that the actual Price of the heat would be some 77% of the sum based upon gas price and boiler efficiency alone.

3 Maximum boiler outlet temperature 98 degrees centigrade.
4 Inlet gas pressure minimum of 100 millibar.
5 Efficiency measurement based upon the following formula:
Efficiency (%) = Heat Output (kW) / Gas Input (kW)

Note: Gas Input (kW) is based upon the gross calorific value of British Natural Gas.

31 I found the issues at the Hearing to be amenable to simplification into the following questions:

31.1 Are HeatCo or Gorseley entitled to carry out tests for the confirmation of boiler efficiency at any time or only at anniversaries of the Commissioning Date?

31.2 When is the boiler efficiency to be confirmed for the purposes of sub-clause 7.6.1, i.e. to adjust the Price payable under the Contract?

31.3 Is the correct calorific value of gas, to be used in calculating boiler efficiency, the Gross (or Higher) Calorific Value, the Net (or Lower) Calorific Value, or some other value?

31.4 Is the correct method, for the purposes of the Contract, of taking measurements for calculating boiler efficiency, the Direct Method or the Indirect Method?

31.4.1 By Direct Method is meant a method whereby Heat Output is measured by reference to water flow and temperature difference, as with a heat meter.

31.4.2 By Indirect Method is meant a method whereby Heat Output is measured by reference to the energy lost, mainly in the heat in the exhaust gases discharged to the atmosphere, and deducting that lost energy from the Gas Input (expressed as heat).

31.4.3 In an ideal world, with perfect measurement and all losses identified and evaluated correctly, the results of the two methods would be the same. In practical measurements, there will be differences.

31.5 Is the value of boiler efficiency asserted by HeatCo, following tests made in October 2004, the correct value for the purposes of the Contract?

31.5.1 If the value of boiler efficiency asserted by HeatCo, following tests made in October 2004, is not the correct value for the purposes of the Contract, is the correct value the original value of 92.8% or some other value?

32 With the exception of the questions at paragraph 31.5 and 31.5.1, and allowing that the parties have agreed a Commissioning Date for the purposes of this reference, I hold the issues to be issues of interpretation of the Contract, albeit to be informed by their technical context and the opinions of the experts where necessary.

33 As to the question at 31.1, timing of the tests:

33.1 Mr Martin argued that Clause 7.6.1.1 requires the confirmation to be upon the anniversary of the Commissioning Date. Mr MacCordle suggested that the first anniversary of the Commissioning Date was no more than a condition to be met before the tests necessary for confirmation might be carried out and that each subsequent test would be not less than a year after the preceding test.

33.2 On the evidence, I find that the tests required for a boiler efficiency to be confirmed could require more than a single day, so that an anniversary would not be practical. Moreover, the necessity of observing the conditions of Schedule 5 might preclude the use of a particular day, whether because of the climatic conditions, because the greenhouses were not drawing heat at the time, or for some other practical reason.

33.3 Furthermore, it is clear, and I find, that both HeatCo and Gorseley agreed and accepted that tests might take place in May, and indeed in October 2004. I was shown no contemporaneous suggestion that a 'window of opportunity' had been lost. For the avoidance of doubt, I find also that neither Party at any material time suggested that such tests, when correctly carried out, would nonetheless be nugatory or of no contractual effect. Indeed, any such suggestion would be absurd in a practical commercial context.

33.4 Accordingly, I find that the Contract is silent as to when a test may be carried out and that therefore a party may carry out such a test at any time.

33.5 The Contract provides at Clause 10 for the Owner HeatCo to have the duty reasonably to estimate the use of both electricity and heat in the event of meter failure. I hold that it would be consistent with that arrangement for it to be

HeatCo that has the right and obligation to confirm other price related matters such as boiler efficiency.

33.6 In the premises, I find that HeatCo were entitled to carry out the tests when they did, in May and October 2004. It is common ground that the tests of May were flawed and neither Party has sought to rely upon their results.

33.7 For the avoidance of doubt, my finding is that HeatCo may carry out more than one test of boiler efficiency in a single Supply Year.

33.8 I have no authority to amend the terms of the Contract between the parties and do not seek to do so. However, had I thought it necessary in the present reference, unless the parties agreed to the contrary, S.34 and S.37 would have given me power to require an independent body to carry out tests with a view to establish a figure for the purposes of this reference. I mention it because the parties may wish to consider making such an arrangement in the future, or providing for disputes as to pricing to be determined by an expert.

34 As to the question at 31.2, timing of the confirmation:

34.1 The Contract envisages and defines a period called the "Supply Year". In a later sub-paragraph of 2.1 on page 8: *"Supply Year" means each successive period of twelve months from the Commissioning Date.*

34.2 The Supply Year is the point for reconciliation of the electricity supply according to sub-clause 7.3.1.

34.3 There is no reference to the Supply Year in sub-clause 7.6.

34.4 As to the timing of confirmation, the material content of sub-clause 7.6.1 is in sub-clause 7.6.1.1, and reads: "*The boiler efficiency mentioned in Sub-clause 7.6.1 shall be subject to annual confirmation starting from the Commissioning Date. . . . The above process will be repeated annually on the then current figure for boiler efficiency*."

34.5 Mr Martin argued that this meant that the act of testing and the act of confirmation could take place only on anniversaries of the Commissioning Date.

34.6 Mr MacCordle argued that the entitlement to a confirmation arose at the first anniversary of the Commissioning Date and that, whenever a confirmation actually took place, there would be a period of one year from the previous confirmation date before a new confirmation could be made.

34.7 I have not accepted Mr Martin's view that testing must be restricted to a precise anniversary, for reasons set out in paragraph 33 above.

34.8 Carefully reasoned though Mr MacCordle's argument was, I do not accept it. For one thing, it would create a drift between the reconciliation dates used for the electricity supply and the dates used for setting the price for heat. My prime reason, however, is that I hold the words of the Contract to have a plain meaning, at least in regard to the timing of confirmation.

34.9 Thus I find that the Owner is required to confirm the boiler efficiency annually, starting from the Commissioning Date; the confirmation is to be repeated annually to correct or confirm the figure for boiler efficiency. Failing any such confirmation, the boiler efficiency remains, for the purposes of the Contract, at whatever value was previously current.

34.10 I find that the word "annually" in this context has its ordinary meaning of "yearly" or "at yearly intervals". For the avoidance of doubt, I do not find it to mean "on the calendar anniversary" or anything more precise. Insofar as the present matter is concerned, I hold that the proper date for confirmation is in the invoice next following the anniversary of the Commissioning Date each year, which the Parties have now fixed by agreement in these proceedings as 1 February.

34.11 Accordingly, I find that the first invoice in which a new boiler efficiency may be incorporated by way of confirmation will be the first invoice following 1 February in the year immediately following the completion of the relevant tests.

35 As to the question at 31.3, the calorific value of the gas:

35.1 Natural Gas has two different ways in which the available heat energy is measured and declared. They are the Higher Calorific Value (HCV) and the Lower Calorific Value (LCV)[3].

35.2 There was an issue between the parties as to whether or not the 'Note' of Schedule 5 was or was not an 'Operating Condition' for the purposes of sub-clause 7.6.1.1. Mr Martin argued that it could not be an Operating Condition and was a mere note.

35.3 I find that a proposition without merit. The document must be construed as a whole. Item 5 of Schedule 5 cannot have meaning unless the calorific value is defined, because the expression "Gas Input (kW)" necessarily implies that a calorific value for the gas is known. Without a numerical value for the calorific value, no value for the gas input in kW can be calculated.

35.4 On the face of it, a reference to calorific value could mean calorific value at the time the Contract was made, or at the time the tests were conducted. The fact the note is a part of Schedule 5 suggests strongly, and I find therefore, that the value was to be the value at the time that the conditions of Schedule 5 were to apply, the time of testing.

35.5 I find, therefore, that the calculation of Boiler Efficiency for the purposes of the Contract is to be made using the gross or higher calorific value of British Natural Gas as declared by the supplier at the time of any measurement of Boiler Efficiency that may be made for the purposes of the Contract.

36 As to the question at 31.4, the method of assessment of boiler efficiency:

[For the possible assistance of those who may come to consider this, my Award, in some other place, It may be helpful if I set out some basic considerations:

3 Several different terms have been used for the two calorific values of Natural Gas. Unlike coal, which is a pure carbon fuel, Natural Gas is a hydrocarbon fuel, a mixture of compounds of Hydrogen and Carbon. When fully burned in air, the combustion products are Carbon Dioxide (CO_2) and Water Vapour (H_2O), diluted by Nitrogen, which was about $^4/_5$ of the combustion air, but has taken no part in the combustion process. The Lower Calorific Value of Natural Gas is about 90.3% of the Higher Calorific Value, the difference being the latent heat of the Water Vapour content of the exhaust gases. A condensing system recovers some, but not all, of that difference.

Efficiency has a precise meaning in the technical context. It is no more and no less than the proportion of the material or energy consumed in a process that becomes useful product (in the case of materials) or useful energy. Efficiency is given, by convention among scientists, the symbol μ and is expressed as a decimal figure or as a percentage.

There is a Natural Law, the Principle of Conservation, an immutable Law of Physics. Put very broadly, it is that matter and energy are interchangeable, but cannot be created or destroyed. It is manifest in practice by the First Law of Thermodynamics.

There is another Law, the Second Law of Thermodynamics, whose effect was well described in the BBC programme 'In Our Time' broadcast on Thursday, 16 December 2004: "Energy spontaneously tends to flow from being concentrated in one place to becoming diffused and spread out" [4].

The simple effect of these two Laws is that no closed system can have an efficiency in excess of 100%. In practice, the effect of the Second Law is that some energy will be lost every time there is a transfer or change of energy, so that practical efficiencies are inescapably less than 100%.

There is an historical anomaly, however, well known to engineers, in the way efficiencies are assigned to boilers. It results from the fact that hydrocarbon fuels burn to form water vapour among the products of combustion.

Boiler manufacturers customarily used the Lower Calorific Value for calculating efficiency, on the basis that the latent energy of vaporisation of the water vapour was irrecoverable in any event. This gave a more favourable impression, a higher apparent efficiency. It is correctly termed the "Net" efficiency because it is based on the Lower or Net Calorific Value.

The advent of condensers and condensing boilers, however, meant that some part of the latent heat could be made useful. If the efficiency of a condensing system is calculated on the basis of the Lower Calorific Value of the fuel, then it becomes conceivable that an apparent efficiency in excess of 100% might be found. That results from excluding the latent heat from the input, but including some of it in the output, the illogicality of which is obvious.

4 http://www.bbc.co.uk/radio4/history/inourtime/inourtime_20041216.shtml accessed 14 July 2005

That is why it was possible, in the present proceedings, for reference to be made to the possibility of net efficiencies in excess of 100%.]

36.1 Mr MacCordle sought to argue that HeatCo were required by the Contract to use the so-called Direct Method of measurement of boiler efficiency.

36.2 In the alternative, he argued that it was a method permitted by the Contract.

36.3 In essence, he relied upon the formula expressed in Schedule 5 of the Contract, which I have set out in paragraph 30 of this award, on page 7. That is a very persuasive argument, because the formula of the Schedule is an exact statement of the Direct Method. Expanding the equation into words, it can be said to read, "to find the boiler efficiency (as a percentage), take the Heat Output of the Boiler (in kilowatts) and divide it by the Gas Input (also in kilowatts)".

36.4 Be that as it may, it is very common for there to be no means of measuring the Heat Output directly. Mr de la Caffré was clear, and I accept, that nearly all the installations of which he was aware used indirect methods for measuring boiler efficiency. He told me that he was not aware of any of those installations having heat meters.

36.5 Essentially, the Indirect Method also can be expressed in the same words. It merely becomes necessary to add another sentence: "To find the Heat Output, ascertain all the losses to atmosphere or elsewhere and subtract them from the Gas Input".

36.6 Mr Martin told me that the Direct Method was not permitted by the Contract. He directed me to the definition of the heat meters in Clause 2.1.

36.7 The general application of the definitions themselves is on page 5 and reads: *'In this agreement unless the context otherwise requires:-'*. On page 7 is found ' *"Heat Meters" mean the Meters located at the common manifold after the boiler for the express purpose of measuring the consumption of heat by the Customer.'*

36.8 Mr Martin argued that the word 'express' was to be interpreted as meaning 'exclusive' and therefore as prohibiting the use of the Heat Meters for any other purpose, including measurement of boiler efficiency.

36.9 The word 'express' has several meanings, but the ordinary meaning, in the context of this Contract, must be that of 'explicit - not implied - specific'.

36.10 I find that, had the drafters of the Contract intended the Heat Meters to be unavailable for any other use, then it was open to them to use the words 'exclusive purpose' or to add the words 'and for no other purpose' to the definition.

36.11 Moreover, even if the word 'express' were intended to mean 'exclusive', measurement for the purpose of assessing boiler efficiency will be measurement of the heat consumed by the Customer, albeit for the period of the test, provided the boiler is delivering the heat to the greenhouses when the measurements are made. It is the useful Heat Output that is the numerator of the efficiency fraction and the useful Heat Output that is consumed by the Customer and paid for in the account.

36.12 Mr Martin's second argument was that the method used in the preparations for the Contract, the source of the figure of 92.8% for the boiler efficiency, must have been the Indirect Method.

36.13 His reasons were twofold:

36.13.1 The evidence of Mr de la Caffré, which I accept, was that almost all the agricultural/horticultural heating systems he knew had their efficiency assessed by an Indirect Method; at the hearing, he thought that few, if any of those installations had Heat Meters.

36.13.2 The fact, accepted as common ground, that in all probability Heat Meters were not installed at the time of the calculations which resulted in the 92.8% efficiency value in the Contract.

36.14 On an examination of the Contract and the evidence, however, I find that, whatever the basis of the 92.8% figure in the Contract, it could only have been intended to remain effective until the first review. The reasons for that finding are:

36.14.1 At sub-clause 7.6.1, the initial value of the boiler efficiency is given as 92.8% - without explanation.

36.14.2 At sub-clause 7.6.1.1 the boiler efficiency is to be subject to annual confirmation, the confirmation to be measured under the conditions of Schedule 5 and the confirmed value is to replace the figure of 92.8% in sub-clause 7.6.1

36.14.3 At Schedule 5, the Contract requires efficiency to be calculated on the basis of the Higher Calorific Value (HCV) of the Gas.

36.14.4 In the sheets which accompanied the letter of 23 October 1997 from Mr D. Houweling of Gorseley to OldHeatCo Limited for Mr Dudley McDonald, the value is explained and identified as *'Boiler efficiency on bottom value = 92.8%'* ; this should be contrasted with *'Boiler efficiency on upper value = 83.7%'*.

36.14.5 It is clear from the foregoing, and I find, that the value of 92.8%, written into the Contract for use pending the first confirmation, was not based upon the HCV of the Gas and therefore that, whatever the method used to determine the value of 92.8%, it cannot be any guide as to the method to be used for confirmation of boiler efficiency.

36.15 For the immediate purpose of the arbitration, it would be sufficient for me to hold that the use of a Direct Method of assessing boiler efficiency for the annual confirmation was permissible under the Contract, and I do so hold.

36.16 Be that as it may, the parties have put in issue, quite reasonably, the question as to whether or not the Contract requires a Direct Method to be used. I have been satisfied by the way in which each Party has put its case that it would be helpful, and indeed proper in the circumstances, to determine that point.

36.17 Accordingly, and for the reasons set out in the preceding paragraphs, I find that the Contract, by the words of Schedule 5, requires boiler efficiency to be assessed by reference to direct measurement of Heat Output, by reference to the installed Heat Meters.

37 As to the question at 31.5, the measurements made by HeatCo in October 2004:

[To assist the parties, and before considering the evidence and argument, I should say that, although I am myself an engineer, my duty as an arbitrator is to weigh the evidence and

argument and to make my decision on that evidence, using my own knowledge and experience in the analysis of the evidence, but not using my own knowledge or experience to "second-guess" the evidence of the parties. An arbitration is not an expert evaluation. I have to decide, on the evidence, whether HeatCo's assertions as to the efficiencies they recorded are proven in these proceedings or if they are to be dismissed or amended in the light of that evidence.]

37.1 In paragraph 33.6 on page 9 of this Award, I have found that HeatCo were entitled to carry out the tests at the time.

37.2 On the evidence, I find that there was agreement between the parties that tests would take place in May and then in October and that it is more probable than not that both parties understood, or should have understood, the method that HeatCo would use. For the reason given at 33.3, I have found that the parties must be held to have expected the confirmation of boiler efficiency following those tests to have contractual effect.

37.3 It is common ground between the parties that no steps were taken before May 2004 to implement the arrangement, in sub-clause 7.6.1.1, for confirmation of the boiler efficiency.

37.4 Tests were carried out by HeatCo, with Gorseley's agreement, in May 2004. The report of those tests has been provided to me at page 92 of File 3 of the document bundle in this reference. I hold that in commercial arbitration, and as a matter of practicality, the documents provided to the Arbitrator, in the absence of objection, are in evidence without the necessity for them to be adduced or proved by witnesses.

37.5 The report, which is dated 5 May 2004, shows that there were two tests at the time, one by HeatCo and another by a Mr Charles of Enérgie whom I assume to have been Mr Charles de la Caffré, Gorseley's expert witness in these proceedings. It reports a substantial discrepancy (1.8 MW) between the two methods. Mr Wray, of HeatCo, who appears to have prepared the report, suggests that difference in method may not explain this discrepancy and offers three possible causes:

> *"1. The heat meters are reading inaccurately and need to be checked, cleaned and calibrated.*

2. *There are water flows within the boiler not going through the heat meter, which have not been identified.*

3. *Losses to atmosphere either via the stack or radiant heat are occurring."*

Radiant heat is discounted in the report as unlikely to be significant.

37.6 Further tests were made in October 2004. It was accepted at the hearing that this followed a re-calibration of the Heat Meters, which should have had the effect of validating their readings.

37.7 Reference was made, at the hearing, to the tests carried out for Gorseley by Enérgie. Mr Martin made it clear that Gorseley were not offering them as evidence of an alternative value to be used in the present proceeding.

37.7.1 Indeed, in his written opening submission, entitled 'Skeleton Argument' Mr Martin had gone further, submitting that I had no '. . *locus or authority to deal with the Enérgie tests as they are not the subject of reference defined by the pleadings*' (Paragraph 51 of his argument).

37.7.2 I have not accepted Mr Martin's view of my authority. I hold the procedural position to be that an enquiry I may see as proper is not limited to the words used in statements of case, provided it is capable of being relevant and provided the parties have not agreed otherwise.

37.7.3 For the purposes of the Hearing, I found the substantive position to be that, insofar as Enérgie have carried out tests on the installation at Gorseley, and either Enérgie or the method they employed appears to have been a likely source of the initial figure for boiler efficiency in the Contract, their results are capable of being of evidential value.

37.8 Attention was drawn, at the hearing, to discrepancies between the Enérgie and the HeatCo assessments. I have noted some points in relation to the Enérgie assessment for completeness but in deference to Mr Martin's reservations as to his own use of the assessment, I have not relied upon it in my decisions.

37.8.1 In the Enérgie assessment, there is a highlighted value which reads: *"Efficiency Hi, included condenser . . . . 98,46"* [the comma is the decimal separator of choice in many Continental countries]. However achieved, that is not the value to be used in the Contract. 'Hi' is identified as the lower calorific value of the Gas. It is the HCV which is required by the Contract - see paragraph 35.5 of this Award.

37.8.2 Other values given for efficiencies including the condenser are *"Hs . . . 88,61"* and *"average . . . . 93,54"*.

37.8.3 I was offered no evidence as to the possible significance of that average efficiency; 93.54% appears to be nothing other than the arithmetic mean of 98.46% and 88.61%.

37.9 Mr de la Caffré doubted HeatCo's results. He was of the opinion that the possibility of leakage past valves was sufficiently likely to account for the apparent differences between HeatCo's results and the Enérgie results. He pointed out that some of the valves were several years old.

37.10 Mr Willings was of the opinion that leakage was unlikely, as the valves were of a type having elastomeric seals. He understood that there had been occasions on which the pipework had been opened with the valves closed and that no leakage had taken place.

37.11 Mr de la Caffré then supported his own opinion by reference to an event in another HeatCo installation (which I will call the "scalding incident") where a person was scalded by water leaking past such a valve.

37.12 This point, that of leakage, is one I find to be of importance. It is fundamental to a consideration of the reliability of HeatCo's tests and their results, as Mr Wray recognised in the report I have cited at paragraph 37.5, the report of the test in May 2004.

37.13 The scalding incident was not pursued at the hearing. HeatCo referred to it, however, in the submission made after the hearing in response to my aide-memoire (see paragraphs 20 and 21 on page 4 of this Award); Messrs Irons Infire wrote, on behalf of HeatCo:

> *"3.1 During cross examination Mr de la Caffré referred to a serious injury incident involving a OldHeatCo (HeatCo) installation in a Horticultural application which was caused by valves leaking. This was used as evidence of his view that significant leakage occurs across a closed valve.*
>
> *3.2 This incident was the subject of a Health and Safety investigation, case number F070000299. An employee of an electrical contracting company was scalded when he inadvertently opened the valve handle of an uncapped pipe. In fact, the operative stood on the valve handle. This incident was not in any way attributed to the valve leaking by* [letting by?] *when closed - any leakage would have been obvious. Regrettably Mr de la Caffré has been misinformed."*

37.14 Mr Martin has pointed out, quite correctly, that Mr Fuller's reference to the scalding incident amounted to new evidence. It was not, strictly speaking, a comment upon or a reply to my aide-memoire. However, evidence of the scalding incident itself does not appear to have been presaged in the pleadings or the witness statements. HeatCo were entitled to have an opportunity to respond to what was already the introduction of new evidence at the hearing, and Gorseley to comment upon that response.

37.15 The HSE report is a public document. I saw it on a website[5]. For what it is worth, the HSE document summarises a prosecution under s.3(1) Health and Safety at Work Act 1974. The Defendant was OldHeatCo Ltd and the summary refers to an incident on 1 December 1999 at Manor Nursery, Harlow in Essex, in the following terms:

> *"Employee of electrical contracting company scalded when inadvertently opened valve handle of an uncapped spare pipe of a hot water header on a recently installed horticultural hot water heating system. Reason for prosecution - Client was in overall control of the installation project & employed the system installer - spare pipe should not have been left uncapped."*

5 To be found at: *http://www.hse.gov.uk/prosecutions/case/case_details.asp?SF=CN&SV=F070000299* - accessed Friday 22 July 2005

37.16 Because I had seen the summary, I took the unusual course of instructing my Personal Assistant to contact Mr Martin and Mr Fuller by telephone to invite them to say if there was any reason why I should put it out of my mind. That was done on Friday 22 July 2005.

37.17 There was other correspondence, but Mr Martin, for Gorseley, writing on 27 July 2005, quite properly calling attention to some difficulties in obtaining instructions and further opinion, reminded me that the purpose of the Arbitration was to deal with issues arising from the Agreement and not a general scientific enquiry.

37.18 Mr Fuller wrote on 28 July 2005, enclosing a copy of what he described as a Health and Safety Report, over the name of solicitors for the HSE and dated 21 June 2001. On 29 July 2005, Mr Willings, expert for HeatCo, also wrote with some details of the calculation associated mainly with the Indirect Method of efficiency assessment.

37.19 It is unfortunate that the two experts did not discuss the incident at Manor Nursery before the hearing of 15 June 2005. It is also unfortunate that they do not appear to have discussed in more detail the nature of the calculations that were required for both Direct and Indirect methods of efficiency assessment.

37.20 However, I find that, although the information I have been given after the hearing is of interest in the general context of the installation on site, I am not required to take it into account in determining the issues in this Arbitration.

37.21 Mr Martin has made it clear that Gorseley do not propose the Enérgie results as alternatives to HeatCo's results. To the extent that Gorseley wish me to consider the Enérgie results at all, it is as evidence of likely error in the HeatCo results.

37.22 Enérgie's measurements and calculations relate to a method different from that used by HeatCo and I have found that HeatCo were correct to use the Direct Method for calculating boiler efficiency. I accept Mr Martin's argument that I am not, therefore, concerned further with the work done by Enérgie. I have no criticism of the work done by Enérgie. I have simply found that it was directed to an end different from that envisaged by the terms of the Contract.

37.23 As to the incident at Manor Nursery, it was suggested by Mr de la Caffré that it evidenced or might evidence leakage of the type of valve used on both

installations. His suggestion was made in the course of his evidence, was not in his report, and there was nothing at the hearing to substantiate the proposition that there had been leakage past a closed valve.

37.24 I find that insufficient, in itself, to do more than raise a question. I have to decide if the doubt raised by Mr de la Caffré should override other evidence, that of Mr Willings as to the improbability of significant leakage. On balance, and I am satisfied that both experts were giving me their honest professional opinions, I favour Mr Willings on this point. His reference to elastomeric seals within the valves I found persuasive.

37.25 Consequently, I have no need to take the incident at Manor Nursery into account. I can say, however, that before disregarding the HSE report, I read it to see if there was anything in its content that was capable of affecting my decision. I found nothing that was apt to affect the decision I had made, that leakage sufficient to invalidate HeatCo's readings and results had not been demonstrated by Gorseley.

37.26 It has not been suggested to me that I should seek to distinguish between the three phases of installation of the plant. Mr Martin has said, in effect, that I must decide for or against HeatCo's figures and may not explore my own assessment. In this Arbitration, having regard to the arguments and conduct of the parties, I hold that he is correct and accordingly, I find that the correct values of Boiler Efficiency, following the tests of October 2004, are:

Phase 1 & 2 Efficiency 83.9%
Phase 1 & 2 Efficiency 84.9%
Phase 1 & 2 Efficiency 88.5%

Costs

38 Costs are reserved pending further representations. For guidance, I record my opinion, subject to what the parties may say, that closer discussion and co-operation between the experts could have saved a great deal of time and effort on the part of lawyers and others.

And for the reasons set out above, I NOW AWARD AND DECLARE THAT:

1 I find the Contract between HeatCo Limited and Gorseley Produce Limited (the Contract) to provide for an annual test to confirm the Boiler Efficiency;

2 I find the Contract to provide for the price of Heat Energy supplied to Gorseley to be adjusted according to a confirmation of Boiler Efficiency, the said adjustment to take effect at the end of the Supply Year in which the annual test was carried out;

3 I find by Consent of HeatCo Limited and Gorseley Produce Limited that the Supply Year defined in the Contract commences and shall continue to commence on 1 February each calendar year;

4 I find the Contract to provide that the value of Boiler Efficiency for the purposes of assessing the price of Heat Energy supplied to Gorseley be calculated using the Higher Calorific Value declared by the supplier of the Gas supplied. If there is an issue as to the construction of this finding in the event that different values are declared during a Supply Year, the value to be applied shall be the mean value of Higher Calorific Values declared for each of the Supply Periods in that Supply Year;

5 I find the Contract to provide for the value of Boiler Efficiency to be ascertained by reference to a measurement of the Gas supplied, as recorded by the Gas Meters, and a measurement of the Heat provided, as recorded by the Heat Meters;

6 I find as a fact, based on the evidence I have been given, that the correct values of Boiler Efficiency, following the tests of October 2004, are:

Phase 1 & 2	Efficiency 83.9%
Phase 1 & 2	Efficiency 84.9%
Phase 1 & 2	Efficiency 88.5%

AND I AWARD AND DIRECT THAT:

7 The invoice or invoices issued by HeatCo following the tests of October 2004 up to and including the last day of January 2005 be withdrawn and invoices substituted using the value of Boiler Efficiency in force at 1 February 2004, namely the Original Contract Boiler Efficiency of 92.8%;

8 The correct values of Boiler Efficiency found in this, my Award, in paragraph 6 of this disposition, became effective for the purpose of assessing the price of Heat Energy supplied to Gorseley on 1 February 2005;

9 Gorseley pay to HeatCo within twenty-eight days hereof the balance of the price of Heat Energy supplied to Gorseley from 1 February 2005 to the date of this Award together with interest according to the Terms of the Contract;

10 Any decision as to Costs be reserved, the Parties having leave to make any representations as to costs within fourteen days of this my Award.

Given under my hand at Wallington, Surrey, in England and Wales this First day of August 2005

Eur Ing Prof. Geoffrey M. Beresford Hartwell
A Chartered Engineer as Arbitrator
Cromwell House, 78 Manor Road
Wallington, Surrey SM6 8RZ
United Kingdom