

Participant Feedback on LRMC Parameters

1 Background

KEMA presented the draft update report on LRMC Technical Parameters at a meeting with representatives of the industry on 3rd July 2009. Subsequent to this meeting written comments/responses have been provided by various participants. This report provides KEMA response to these.

2 Participant Comments

2.1 *Mitsubishi Class F Efficiency*

2.1.1 Keppel

Compared with the other makes of F-class CCGT technology, the Mitsubishi's type F CCGT turbines capacity has seen a notable increase of more than 10% and an efficiency gain of more than 2% since the last set of figures from Gas Turbine World used for the determination of LRMC parameters for 2009-2010 back in end-2008. We would request that EMA look into the accuracy of these numbers as they are seemingly large.

2.1.2 Tuas

We note the efficiency 58.5% is skewed by inclusion at face value of Mitsubishi's plant figure of 59.5%. In the last review, KEMA has accepted that figure for Mitsubishi plant in the GTW 2008 Handbook was probably overstated as it was noticeably higher than the other 3 comparator turbines and made appropriate adjustment. We note the GTW 2009 Handbook also clearly showed the same pattern but no adjustment has been this time round. Given the general principle that higher efficiency plant will command a price premium over less efficient one and that the price being quoted in the same publication for the Mitsubishi make is in fact at a discount to the other 3 comparator makes, the figure of 59.5% is again probably overstated and should therefore be similarly adjusted.

2.1.3 Seraya

The larger size of the Mitsubishi plant will not be dispatched at anything near to full load due to the way reserve is dispatched in the market clearing engine (MCE).

2.1.4 Senoko

Inclusion of outlier plant not appropriate

In attempting to model the F-class 400MW proxy plant, KEMA selected a suite of CCGT turbines with net capacities ranging from 412.9 MW to 464.5 MW. Given that these reference plant are meant to provide an approximation of the operating characteristics of the proxy plant, it is important that the characteristics of the reference plant be as close to the proxy plant as possible. At 464.5MW, the capacity of Mitsubishi's M701F puts it significantly higher than the other reference plant (average=420MW). This also means its efficiency would be out of range than the

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other reference plant. A large plant like M701F would also incur significantly higher land and infrastructure costs, as well as higher running costs due to larger back-up fuel storage requirements. The capital costs outlined in KEMA's paper are inadequate to accommodate M701F's requirements. We request M701F be removed from the list of reference plant as its outlier profile will incorrectly skew the efficiency and heat rate results obtained for the proxy plant.

2.1.5 KEMA Response

The practice of basing technical parameter review on GTW figures has been accepted as the appropriate methodology over the past 6 years of technical parameter resets. KEMA have checked on the accuracy of the efficiency of the Mitsubishi plant and whilst bullish believe it to be correct. Whilst an adjustment was made last time for Mitsubishi plant this created more issues of debate and contention regarding what was an appropriate value – with less publicly available evidence/justification to base a definitive value on. Hence in this Update it has deemed most appropriate to revert to the practice to solely refer to GTW as the authoritative source of Class F plant data. However, given that this is a mid-cycle review and in the light of industry comments and upon further reflection, given the clear differences between the Mitsubishi and the other 3 Type F CCGT plant characteristics (i.e. size, and associated cost economies and heat rate performance) KEMA has decided to remove the Mitsubishi Type F CCGT plant from the calculations of technical parameters for the Proxy Plant as used within 2009-10 Vesting Contracts.

However, EMA may want to consider including the Mitsubishi plant in future biennial reviews based on the following:

- The Proxy Plant is deemed to be 400MW in unit size and thus this presents no dispatch issues within the context of the NEMS. All actual Class F plant differs from the Proxy Plant in capacity terms. KEMA's approach is to normalize the cost to a price per kW in order to calculate the equivalent cost of the 400MW Proxy. This 400MW size was the value used in original determination of 2007-08 and 2009-10 Vesting Contracts and it does not seem appropriate to revisit this decision within this update work. Whilst this may marginally understate this cost it is deemed not material and any adjustment would not be straightforward or definitive to apply in a robust manner. Given the fact that in practice a new entrant CCGT is most likely to adopt Type G or Type H plant, with materially higher thermal efficiencies and materially lower plant costs per kW, this potential minor inaccuracy is trivial in relative terms.

2.2 EMC and PSO fees

2.2.1 Keppel

We note that the PSO fees are obtained from the EMC website based on the PSO budget and fees for FY2007/08. As this mid-term review is intended to provide latest updates for the vesting parameters in setting the vesting price for 2010, we feel that

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the numbers should reflect the latest rates taking into consideration the latest available market data. This should also apply to the EMC fees.

2.2.2 Tuas

KEMA has assumed the EMC fees to be S\$0.3126/MWh, which was presumably derived against budgeted figures based on a positive demand growth rate for 2009. The actual EMC fees for the period from April 09 to June 09 is S\$0.363731/MWh which reflected the sharp falloff in system demand following the global financial crisis. EMA itself has provided a negative demand growth estimate for 2009. Therefore a higher figure should be estimated in the light of known information.

2.2.3 Seraya

The Variable Non-Fuel Cost is understated. EMC fees have been estimated by KEMA at \$0.3126/MWh which appears to be derived by taking the forecast total EMC admin fee of \$28,641,000 and dividing it by 2 multiplied by the forecast NEMS volume of 45,807 GWh from EMC's "Business Strategic Plan & FY 2009/10 Business Plan And NEMS Budget for the Financial Year Ending 31 March 2010" available at https://www.emcsg.com/f8734,140628/140628_Approved_Budget_and_Fees_for_FY_2009_10.pdf. This is an underestimate as it is calculated based on forecast gross volume and the EMC admin fee is actually charged based on forecast net volume. One may refer to "MINUTES OF THE RULES CHANGE PANEL 42nd MEETING" available at "http://www.emcsg.com/f10930,185745/185745_Approved_42nd_RCP_Mtg.pdf" to check that this is the case (specifically section 3.2). It should be noted that the forecast PSO admin fee on a per MWh basis for FY09/10 of \$0.2244/MWh is based on estimated energy sales of 38,210,000 MWh (Refer to <http://www.emcsg.com/n6024,42.html>)

2.2.4 KEMA Response

KEMA utilizes the 2009/10 budget figures formally quoted on the EMC website for both EMC and PSO fees. KEMA has not received any formal notice that these figures are incorrect and/or should be revised. As such KEMA will continue to use the 2009/10 budget figures for each of the EMC and PSO fees.

2.3 Running Cost – cost of Backup Fuel

2.3.1 Tuas

KEMA's arrived at an estimate for Diesel (50 ppm) price (US\$/b) including delivery on site of US\$50.6/bbl using crude oil prices. Tuas Power has earlier submitted to EMA/KEMA for Diesel (50ppm) in the month of March 2009 from reputable and verifiable sources where the actual prices of Diesel (50ppm) being transacted in the Singapore market are in fact about 15% higher.

2.3.2 KEMA Response

Tuas, at the industry meeting, offered to provide recent invoicing details to EMA as to the cost of Diesel. Tuas was not able to provide same so, in the absence of other evidence, KEMA propose that the Diesel costs in the draft report stand.

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2.4 Depreciation Error?

2.4.1 Seraya

For KEMA's calculation of the net upfront cost of the life extension of the Proxy Plant, KEMA appears to use straight line depreciation. However KEMA does not seem to be using straight line depreciation correctly. For the "Initial total capital, land, infrastructure and development cost", after 12 years it should be depreciated by 60% as at the start the initial expected lifetime is 20 years. With the reinvestment extending the expected lifetime by 4 years, the depreciation on a straight line basis at 20 years would be 8/12 of the remaining book value at 12 years which is 40% of the initial total capital, land, infrastructure and development cost". What this means is that instead of 4/24 of the initial total capital, land, infrastructure and development cost being left it should be $(1-(12/20))*(1-(8/12)) = (8/20)*(1/3) = 2/15$.

2.4.2 KEMA Response

As determined in the original determination for the 2009-10 Vesting Contracts; given the known need to undertake life extension works at 12 years and the consequential lifetime for the plant as a whole becoming 24 years; the initial total capital, land, infrastructure and development cost is deemed to be depreciated over the 24 year period on a straightline basis from Year 1.

2.5 Licence Fee Payable

2.5.1 Seraya

KEMA has estimated the licence fee payable by the Proxy entrant for the 2nd year of operation at \$53,600 but this is incorrect as the licence fee is rounded up to the nearest \$10,000.

2.5.2 KEMA Response

KEMA notes this rounding feature. KEMA also highlights it has revised the wider calculation of fees to reflect full operation of the Proxy Plant from Year 1 and to correct the associated variable element of the Licence fee. The consequence of this revision is that the deemed annual EMA Licence Fee is \$770,000 after rounding.

2.6 Index updates

2.6.1 Seraya

PowerSeraya also understands that many of the numbers in KEMA's report would need to be updated as they are based on extrapolated data which would be superseded by the actual numbers when the actual numbers become available.

2.6.2 Senoko

Land, infrastructure and development cost determination not final

We understand that the EMA will (i) further update a number of line items within the land, infrastructure and development cost category; and (ii) potentially review a number of indexation mechanisms applied for this category. We therefore reserve our comments until such updated estimates are made available.

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2.6.3 KEMA Response

KEMA will use latest available indexation data at the time of publication of the final report.

2.7 LNG Issues

2.7.1 Sembcorp

1) Plant Load Factor

KEMA has assumed in its modeling that the proxy plant is able to get the same gas as the rest of the gencos. However, the model has not taken into consideration the market environment in Singapore. With the gas moratorium and the delay in LNG terminal and the expected higher price for LNG, a plant load factor of 73% appears optimistic as the proxy plant may not be dispatched due to its higher running cost .

2) Additional Risk Premium

The model has failed to take into account the additional risk caused by the gas moratorium and a higher LNG cost. This higher environment risk in Singapore should either be accounted for as an additional risk premium in WACC or be adjusted via the Plant Load Factor by using a more realistic assumption on the gas price (probably LNG) of the new plant.

2.7.2 KEMA Response

The price of LNG and a proposed LNG vesting scheme are being considered by EMA as means of easing LNG into the market. KEMA also understand that the LNG price formula has been adjusted following negotiations between EMA and British Gas. As such there is no evidence that LNG will pose a risk, or indeed higher fuel costs to the BNE plant. KEMA therefore propose to take no action with respect to LNG fuel issues.

2.8 Cost of Insurance

2.8.1 Senoko

Cost of insurance – KEMA had provided \$2.7 million for “taxes and insurance during construction”. Senoko’s experience is that this provision is highly inadequate. Given the risk profile of the plant it is anticipated that lenders would require, inter alia, Delayed Start Up (DSU). Such insurance would need to cover any potential loss of earnings from potential delays of the project and the loss of earnings once the property is in full operation. Our estimation is that the cost of insurance for the new entrant plant could possibly be in excess of \$7 million per year.

2.8.2 KEMA Response

The value for taxes and insurance during construction is similar to that agreed in the original assessment made in 2006 for 2007-08 Vesting Contracts and KEMA note it was not challenged at the time of the original determination of 2009-10 Vesting Contracts in 2008. Furthermore KEMA would expect that lenders would simply require owners to fulfil payment obligations from specified dates and that accordingly owners would put in place an appropriate compensation mechanism with the

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contractor to cover loss of earnings associated with a potential delayed start up – thus the burden of DSU insurance would fall on the contractor not plant owner. It does not appear reasonable that such costs should be included nor that such taxes and insurances should be increased by an order of magnitude higher within this update exercise.

2.9 Upfront financing Costs

2.9.1 Senoko

Upfront financing cost – Upfront financing cost (i.e. upfront and related fees payable to lenders other than interest during construction) are substantial. A quick calculation using the assumed capital cost of \$539 million (which will have to be revised accordingly) and construction period of 30 months and bank arrangement fees standing at 3-4%, an additional \$16.2 to \$21.6 million would need to be provided for.

2.9.2 KEMA Response

In each of the original determinations for 2007-08 and 2009-10 Vesting Contracts such proposed upfront financing costs have not been accepted as requiring inclusion. There is no basis within this update work to revisit these decisions.

2.10 Modeling for the Heat rate.

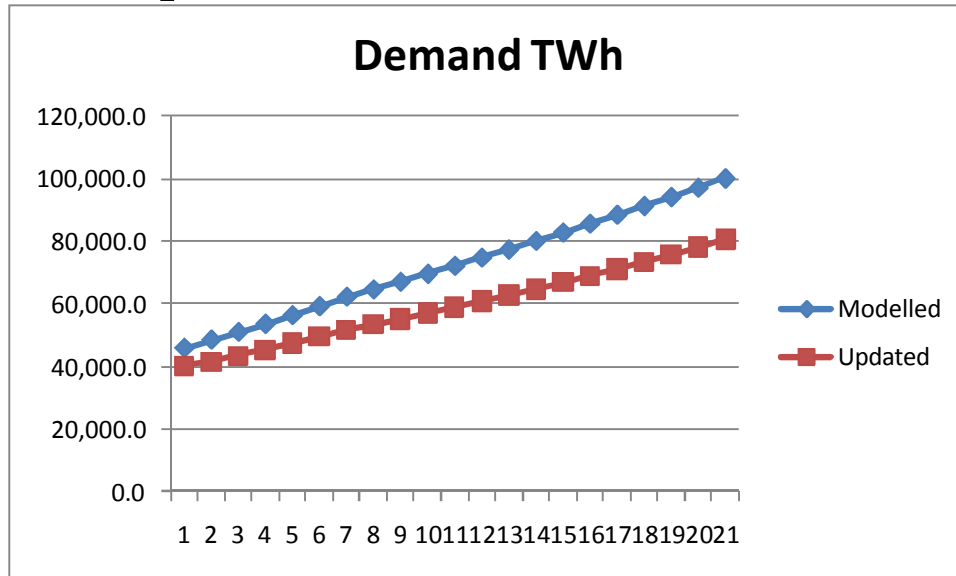
2.10.1 Tuas

Demand forecasts have changed since the last reset and should be used to re-model the plant heat rate. Expectation is that the plant will be scheduled at lower outputs and therefore have a worse heat rate equating to lower efficiency and therefore higher running cost. Additionally assumptions regarding planting should be updated to reflect generation companies' latest plans.

2.10.2 KEMA Response

EMA have updated demand forecasts to reflect the economic downturn. The revised forecasts are shown graphically below:

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From a review of these figures and analysis of the model outputs KEMA conclude that, whilst the lower current demand forecast would impact on new planting to maintain the reserve margin post planting of the Proxy, there would be no impact on the Proxy load factor and corresponding heat rate is in any event being the lowest cost generator at the time it enters the market.

NOTE: KEMA do not model market behavior but rather fundamental cost based dispatch. Since the proxy plant is at the top (i.e. baseload end) of the merit order stack its only competition for dispatch comes in off-peak periods. Consequently re-modeling will not produce a material difference in the heat rate to be used.