



**RESPONSE TO INDUSTRY'S FEEDBACK ON PA CONSULTING'S DRAFT REPORT
"REVIEW OF THE VESTING CONTRACT PARAMETERS FOR THE PERIOD 1 JANUARY
2011 TO 31 DECEMBER 2012"**

27 September 2010

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**RESPONSE TO INDUSTRY'S FEEDBACK ON PA CONSULTING'S DRAFT REPORT "REVIEW
OF THE VESTING CONTRACT PARAMETERS FOR THE PERIOD 1 JANUARY 2011 TO 31
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1. On 25 August 2010, EMA circulated PA Consulting's draft report "Review of the Vesting Contract Parameters for the period 1 January 2011 to 31 December 2012". The industry was invited to provide its feedback on PA Consulting's draft report by 14 September 2010. EMA's and PA Consulting's response to the industry feedback is set out in Appendix 1.

APPENDIX 1: EMA'S AND PA CONSULTING'S RESPONSE TO INDUSTRY'S FEEDBACK

1. FINANCIAL PARAMETERS

NO.	INDUSTRY'S FEEDBACK	EMA'S AND PA CONSULTING'S RESPONSE
DEBT PREMIUM AND CREDIT RATING		
1	<p><u>Senoko Energy</u></p> <ul style="list-style-type: none"> The analysis should not take into account any elements of recourse to, or guarantees or support provided by, parent companies, and should therefore be performed on a pure "non-recourse" basis. Similarly, the determination of the risk profile of a new entrant project should not take into account any long-term contract structures, or other risk mitigation measures, if such structures are not currently in place and/or if there is no clear indication that such structures will become available in the near future. 	<ul style="list-style-type: none"> Nothing within the EMA's procedures for calculating the financial parameters mandates that the new entrant should be assessed on a standalone non-recourse basis. PA Consulting's assessment of the financing costs for setting the vesting price is based on the EMA's Procedures for Calculating the Components of the Vesting Contracts which clearly states that: "The underlying concept of LRMC, as it has been determined, is to find the average price at which the most efficiently configured generation facility... will cover its variable and fixed costs and provide reasonable return to investors". It is important to be realistic about the market conditions that support new entry and the type of investors that are typically involved in electricity generation projects. International experience suggests that a new entrant Independent Power Producer (IPP) relies on risk mitigation measures like guarantees and long term contract structures to facilitate market entry and promote access to affordable financing. International experience also suggests that new entrant IPPs generally require a significant degree of contractual cover before projects proceed to provide financiers with a degree of certainty to the project. There is nothing to preclude such arrangements of long-term contract structures or other risk mitigation

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	<ul style="list-style-type: none"> The argument that "in order to obtain financing in this tight credit environment, a new entrant project will need to be of investment grade" is clearly circular. This statement would indeed seem to imply that a project, which was sub-investment grade in a credit environment with ample liquidity, would become, all else being equal (i.e. without any changes to its risk profile), investment grade in a tighter credit environment. In reality, the intrinsic credit rating of such project should remain unchanged; however in a tighter credit environment this project would potentially be able to raise significantly less and/or shorter term financing, and would therefore have to include more equity in the financing mix. In this respect, it is also worth noting that there has been rather significant activity in sub-investment grade utility bond issuance over the last 2 years (we have compiled a list of 27 transactions in this respect). While most of the entities under consideration are not directly comparable to the new entrant project considered for 	<p>measures from emerging in Singapore, underlining the potential for new entrants to access affordable financing. Without such arrangements or a significant competitive advantage to reduce risks it is highly unlikely that there would be any new entry. There are already a range of risk mitigation and financing arrangements that are in place, including contracts for differences and supply businesses. Generators also have access to balance sheet financing. Similar arrangements may also be available to support new entry.</p> <ul style="list-style-type: none"> PA Consulting asserts that the current financial environment will not support the same projects at the same terms it did previously. Therefore, the parameters in this review have not been constructed according to the same risk profile as in past reviews – that of a merchant project financed on a non-recourse basis – because PA Consulting does not believe this to be the most efficient source of new entry (which is the underlying principle mandated in the EMA's procedures for calculating the parameters of the vesting price). Lenders at present will not provide financing that features the degree of default risk that is associated with a merchant power project. In the U.S., this fact has manifested itself through situations such as that cited in PA Consulting's report, where projects cannot achieve financing without either a long-term contract or recourse to a parent with an investment grade rating. To support new entry in this environment, the Singapore market will have to evolve in a manner that allows one to mitigate the risk associated with power generation (e.g. through long-term contracts, where the risk is shared with the customer).PA Consulting

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	<p>the purpose of the vesting price determination, this issuance activity does show that a fairly broad selection of utilities have considered sub-investment grade bonds as an efficient source of funding over the last 2 years.</p> <ul style="list-style-type: none"> PA Consulting states in its response that it “does not dispute that a shadow rating provided by an agency based on Senoko’s assumption of a standalone, project financed new entrant with a non-recourse financing would achieve a BB rating”. We believe that the stand-alone, non-recourse financed nature of the new entrant is not an assumption, but is the core of the analysis at hand (and we would recommend that an opinion on the methodology be sought from an independent expert in corporate finance if there is no consensus on this). From there, we believe that PA Consulting has confirmed our assertion that the debt premium should continue to be determined based upon the spreads of utility bonds with a rating in the BB category. <p><u>Island Power Company</u></p> <ul style="list-style-type: none"> The debt premium is determined by the economics of the project itself more than the credit rating of the investor’s parent company. The proposed debt premium of 197 bps, though higher than the 	<p>agrees with Senoko Energy’s view that the project would need to include more equity in the financing mix under the assumption of a tight credit environment, as reflected in our findings. Finally, with regards to the list of transactions, it is not clear that the entities under consideration regarded sub-investment grade bond financing as an efficient source of funding. It may be that it was the only practicable option given the circumstances at that point in time.</p> <ul style="list-style-type: none"> PA Consulting is of the view given the general flight to quality in today’s tight credit environment, a non-investment grade project would have great difficulty finding economic financing on a non-recourse basis, and would not be the most efficient new entrant. PA Consulting has been engaged by EMA to provide independent advice on setting the vesting parameters. PA Consulting would like to point out that nothing within the EMA’s procedures for calculating the financial parameters mandates that the new entrant should be assessed on a standalone non-recourse basis. If a project is supported by appropriate risk management measures then its risk profile will support appropriately efficient low cost financing. The proposed debt premium of 197 bps was not intended to reflect the risks

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	<p>initial assumption of 160 bps, does not reflect current market conditions nor the risks associated with non-recourse project finance in a merchant power market like Singapore's. The proposed debt premium is not supported by recent transactions which showed margins of at least 250 basis points.</p> <p><u>Sembcorp Cogen</u></p> <ul style="list-style-type: none"> • PA Consulting has agreed that a replacement cost adder would be appropriate to account for the risk of an uncontracted plant. Hence, we would like to request for EMA & PA Consulting to propose an appropriate cost to be included in this review then. • PA Consulting's response on debt premium has missed out the fundamental point of our comment i.e. debt can be raised via bond or loan from the Bank (i.e. non-recourse project finance), the point we are making is that a non-recourse project finance debt premium should be used instead of a bond debt premium. 	<p>associated with non-recourse project finance in a merchant power market. It was selected according to a proxy credit rating of BBB-, a rating arrived at taking into consideration the credit ratings of the comparator companies. However, Island Power Company, a new entrant with an investment-grade parent company -- GMR -- has indicated its financing spread is 250 basis points. Based on this evidence, the debt premium is set at 250 basis points, which is higher than the other empirical data determined by PA Consulting.</p> <ul style="list-style-type: none"> • To clarify, in response to a previous question from Sembcorp Cogen, PA Consulting clarifies that a replacement cost adder would be appropriate "if one assumes a firm contracted position for the new entrant (not unit contingent)." As stated, PA believes that a measure of project risk will need to be mitigated to facilitate efficient new entry. While this risk mitigation might occur through long-term contracting, there are other ways in which the project risk could be hedged to the extent needed to merit investment. In light of the prevailing uncertainty regarding the development of contracts in the Singapore market, PA Consulting has not included an adder. • Bonds are an appropriate proxy for the cost of debt of a new entrant for several reasons. Credit shortages and increased scrutiny from banks have increased the relative reliance on capital markets for project financing, and bonds can now generally be employed for the same purposes as bank loans. Even when projects start out using bank financing they may

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	<p>Independent Power Projects in Singapore were funded by project finance and not through issuing bonds. Sembcorp Cogen is a good example in the Singapore market, as such, the use of bond instrument debt premium is definitely not the correct proxy for the cost of debt of a new entrant.</p> <ul style="list-style-type: none"> The determination of LRMC is to find the average price at which the most economic plant will operate in Singapore to recover its variable and fixed cost + reasonable returns to investors. Therefore, a good proxy to Singapore market condition should be used at all times. It would be inappropriate to just apply the methodology used in previous determinations for debt premium as a guiding principle. <p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> From page 8 of the Draft Report, a BBB- credit rating is used to determine the debt premium for calculating the Vesting Contract Price. PA Consulting's view is that a new investor would have to be investment grade or a long-term power purchase agreement. PowerSeraya views that a new entrant into Singapore would be standalone non-recourse project financed with a credit rating no higher than BB+ and possibly lower. The BB+ credit rating has been used in past reviews to determine the debt premium for 	<p>refinance using bonds after a relatively short period – with average financing costs over the project life relating more to bonds than project financing. Furthermore, within the context of the vesting contract review, it is important that the cost of debt be determined based on publically available, market-based data, which can be said of bond yields but not necessarily bank loans.</p> <ul style="list-style-type: none"> PA Consulting agrees that it would be inappropriate to apply without question the methodology used in previous determinations when calculating the debt premium, and that the LRMC is the average price at which the most economic plant will operate in Singapore while covering costs and providing a reasonable return to investors. This is why PA Consulting has considered the impact of today's financial environment on the cost of debt rather than simply basing its evaluation on the credit rating used in past reviews. Given the current financial market environment, a project consisting of single asset plants with no portfolio diversification would need the revenue certainty that comes with a long-term power purchase agreement (PPA) or other form of risk mitigation measures to be able to achieve cost effective financing. Whilst a sub-investment grade rating might have been a fair proxy in past reviews based on the credit environment then, PA Consulting sees little evidence in the market today to indicate that a sub-investment grade project could achieve cost-effective non-recourse financing.

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	<p>determining the Vesting Contract Price. For the 2009-2010 review, the debt spread of 10-year BB+ rated corporate bonds issued by utilities companies from the corporate debt spread report published by Bondsonline Group (based on Reuters market data) was used. Using a similar methodology for the review for 2011-2012, a debt premium of 230bps for a credit rating of BB+ would be obtained (using data as at 28 May 2010, 29 and 30 May 2010 being the weekend and 31 May 2010 being a public holiday).</p>	<p>Consequently, when defining the business and financial risks associated with the hypothetical new entrant, it was assumed that a certain amount of risk mitigation would need to occur to secure favourable financing in the current credit environment (it could take the form of limited recourse to a credit worthy equity sponsor). The extent of this recourse would be reflected in the credit rating of the project, and would support the investment grade supposition. However, Island Power Company, a new entrant with an investment-grade parent company -- GMR -- has indicated its financing spread is 250 basis points. Based on this evidence, the debt premium is set at 250 basis points, which is higher than the other empirical data determined by PA Consulting.</p>

2. TECHNICAL PARAMETERS

NO.	INDUSTRY'S FEEDBACK	EMA'S AND PA CONSULTING'S RESPONSE
PLANT LOAD FACTOR/CAPACITY FACTOR		
1	<p><u>Senoko Energy</u></p> <ul style="list-style-type: none"> We note that the capacity factor is too high and that it is unrealistic to assume that a new entrant would be able to sustain the proposed capacity factor over a 24 year economic life. In response to this feedback, PA's draft report (dated 25 August 2010), contains a comparison of capacity factors determined using the 12 month look back method and the results of market modelling. PA's conclusion is that if market modelling results are used, then the capacity factor would be higher. This is a highly counterintuitive conclusion and reflects some very unusual trends in their modelling results, for example: The new entrant unit (LNG-fired F-class CCGT) is able to sustain a high capacity factor of approximately 80% in the first 15 years. Island Power (also an LNG-fired F-class CCGT) is only able to sustain a low capacity factor in the range of approximately 25% to 50% over the same period. Senoko supports use of an appropriate forward looking estimate of the new entrant capacity factor. To be realistic, such modelling should take into account, among others, PNG/LNG fuel cost relativities. Senoko's own modelling shows that LNG-fired new entrant can expect a capacity factor that would initially be in the mid 70% range with a subsequent decline over the life of the asset 	<ul style="list-style-type: none"> The market modelling shown as part of the appendix to the report was for the sole purpose of determining the economic life of the plant and was not used to determine the plant load factor as EMA had determined the plant load factor or capacity factor to be based on the average historical plant load factor of the existing Class F plants (Senoko CCP 3 to 5, Seraya CCP 1 and 2 and Tuas CCP1 to 4) for the 12 months leading up the base month with work units or station load excluded in the calculation. Similarly, the part load factor or the average operating load used in deriving the heat rate should be computed on a similar basis i.e. based on the actual performance of the most efficient CCGTs in the system rather than based on a lifecycle approach. The part load factor reflected the average operating load when the plant is running and this figure is always higher as compared to the average plant load factor as the part load factor does not take into account economic outages. Predicting the plant load factor over the lifecycle of the plant presents difficulties, as the modelling results for the plant load factor is highly sensitive to minor differences in input assumptions such as position in the transmission network and minor differences in heat rate. As the new plant is hypothetical, such factors are unknown. Given the uncertainties over the rate at which the plant would be displaced by more efficient technologies and how market conditions would evolve over the lifespan of the plant, this further poses difficulty in predicting the plant load factor over the lifecycle of the plant.

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	<p>as more efficient technology enters the system.</p>	<ul style="list-style-type: none"> • However, the 24 year economic life result from the modelling is robust. Other CCGT plants built around the same time (e.g. SembCorp expansion, Senoko CCGT 2) also experience a significant drop in utilisation after 2034 in the modelling results. Also, the 24 year result has proven to be consistent over a range of input assumptions, such competing plant capacities and variations in demand assumptions. • It was assumed in the previous review that the plant is refurbished after 12 years of operation. The refurbishment extended the economic life to 24 years; and the residual value beyond 20 years was taken into account as a reduction to the capital costs. This in effect meant that the assumed life is 24 years, not 20 years (see KEMA's Report for EMA, "LRMC of CCGT generation in Singapore for technical parameters used for setting the Vesting Price for the period 1 January 2009 to 31 December 2010", dated 22 June 2009). The model used by PA Consulting to determine the economic life also supports the 24 year economic life. The model does factor in the assumption that plants built in the future will be incrementally more efficient than those that are built now. This is clearly stated in the assumptions. Indeed we would point out that one of the Gencos have indicated to EMA that its proposed new CCGT would have an economic life of 30 years. • It should also be noted that no actual plant corresponding to "zNewCCGT" is actually being built. Therefore, these modelling results are not a realistic prediction of the capacity factor that other competing generators, such as Island Power, would achieve in practice. • Our assumption is that, in the long term, PNG and LNG should be price

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	<p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> On page 42 of the Draft Report, from the modelling results, the plant capacity factor for Island Power CCGT is very much lower than for zNewCCGT which is the theoretical new entrant. It does not seem to make sense that Island Power CCGT, a later entrant would have a very much lower plant capacity factor. The modelled plant capacity factor for Island Power CCGT also does not gel with Island Power's plans to plant. With such a low plant capacity factor, planting would not be economically viable. 	<p>competitive, as they are the same fuel for the end user. Therefore, we have not assumed any price difference. In any case, LNG will not be available until 2013 at the earliest.</p> <ul style="list-style-type: none"> We cannot comment on any due diligence modelling performed for the Island Power project, but it is very unlikely that it included a competing station corresponding to zNewCCGT. As there is no actual project corresponding to zNewCCGT, the specific capacity factor for Island Power will likely be higher than shown in the modelling results.
FIXED ANNUAL RUNNING COST		
2	<p><u>Senoko Energy</u></p> <ul style="list-style-type: none"> Head office costs are derived as 25% of manning costs, leading to an allowance of \$1.05m for two generating units (equivalent to 10.5 FTE). This allowance is intended to cover corporate management, governance, HR, accounting and legal costs and CSR. Senoko considers that the allowance is insufficient to cover the services listed above. Based on Senoko's experience, the new entrant would need resources at least equal to the 42 FTE required at the plant to cover the stated activities as well as: fuel and currency hedging, middle office, gas nominations and balancing, regulatory affairs and IT. 	<ul style="list-style-type: none"> Only head office support directly associated with power generation should be included as part of head office costs. As noted in the report this is a nominal allowance for head office support to the power station. Services that are related to the services of the plant include support services for generation such as trading, corporate management and governance, human resources and management of group policies, accounting and legal costs at head office and corporate social responsibility costs. The way in which other costs such as trading, nominations, settlements, accounts, etc are shared between business activities is not revealed and has not been separately identified in previous reports.

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	<p><u>Island Power Company</u></p> <ul style="list-style-type: none"> IPC understands that PA has assumed 42 O&M staff to man the power plant of 2x400MW. This is a reasonable assumption. However, PA has underestimated the head office services cost, which in the current estimate is equivalent to about 10 employees. All generating companies in Singapore have to dedicate substantial manpower to handle the retail business, energy trading, gas trading/nomination, fuel and foreign currency hedging in addition to general accounts function and human resources. A typical 2x400MW generation company in Singapore will require a head count of close to 100 persons (far higher than 52 staff assumed by PA). EMA can easily verify the manpower level of the existing generating companies. The head office services cost is at least of the same level as the O&M manning cost. <p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> On Page 32 of the Draft Report, it has been estimated that the manning and head office costs for 2 units is \$5.25million. Manning Costs have been indicated as SGD100000/person/year. So this implies a total manpower of 52.5 persons (given the \$5.25 million). The manpower requirement appears to be rather understated. The following PowerSeraya group figures are given for comparison. The PowerSeraya group headcount (excluding PetroSeraya) was 377 as at 31 May 2010. PowerSeraya generated 11,711,525 MWh from June 2009 to May 2010 with a 	<ul style="list-style-type: none"> In the previous reports, the manning and head office costs are bundled (with non-fuel working capital costs) and are not dissected. The head office cost allowance has now been calculated from the previous reports, adjusted for inflation. The “manning, head-office and [non-fuel] working capital costs” are consistent with the earlier reports. An allowance of 60% head office costs (as a percentage of on-site manning cost) has now been used which is equivalent with the previous report.

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	total licensed capacity of 3100MW. The PowerSeraya group would enjoy economies of scale in terms of manpower.	
IMPACT OF AGC		
3	<p><u>Senoko Energy</u></p> <ul style="list-style-type: none"> Senoko has previously raised the need to take into account the impact of AGC on generation unit efficiency. In the Singapore system, load fluctuations reduce unit efficiency by 0.5 to 0.6%. PA's response to our previous query on this topic was that Singapore is not unique in regards to the need for AGC and that they do not consider an additional factor for normal system load fluctuations to be appropriate. Senoko's view is that if such impacts are "normal" then there is no reason not to include them as was done by KEMA in previous reviews. 	<ul style="list-style-type: none"> The part load impact is accounted for already. Adjusting for the small perturbations caused by system frequency fluctuations and AGC operation is not a separately recognised factor. Small frequency perturbations occur on all systems and the impact on heat rate is not sufficiently material to warrant a separate factor. To the extent this creates a change in heat rate, it would be second or third order and covered by other allowances. The previous 0.5% allowance appears excessive.
GAS COMPRESSORS		
4	<p><u>Senoko Energy</u></p> <ul style="list-style-type: none"> As discussed at the plenary session on 27 August 2010, generation facilities in Singapore require gas compressors to increase the inlet gas pressure to operational levels. For Senoko's Alstom GT26 units to achieve the required inlet pressure of 45 bar, fuel gas compressors have been installed and are operated in a baseload manner. The corresponding capital costs and reduction in net generation (our compressors have a rated capacity of 3.55MW) and net heat rates associated with fuel gas compressors should be reflected in the vesting parameters. 	<ul style="list-style-type: none"> PA Consulting has reviewed the need for the inclusion of gas compressors by taking into account Singapore's gas pressure profile and the number of hours during which the gas compressors were expected to be running. The impact of gas compressors has been incorporated in the final report.

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	<p><u>Island Power Company</u></p> <ul style="list-style-type: none"> • All the gas turbines referenced in PA's report – namely Mitsubishi 701F4, GT26B and Siemens SGT5-4000F – require gas compressors to raise the gas pressure due to higher compression ratios of these latest gas turbines and use of advanced pre-mix burners. This can be verified from actual installations in Senoko (701F4 and GT26B) and Seraya (SGT5-4000F). Island Power's project (based on Siemens SGT5-4000F) also requires gas compressors. The typical power requirement of a gas compressor is 3 MW. • The gas compressor has a three-fold impact: <ul style="list-style-type: none"> a. Higher capital cost; b. Lower net output (reduced by 3MW); and c. Higher heat rate <p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> • From page 13 of the Draft Report, it appears that PA Consulting has not factored in the cost of installing gas compressors as well as the impact in terms of net capacity and heat rate. PowerSeraya has installed gas compressors for its two recently commissioned cogens (commissioned this year 2010). Tuas Power Ltd in its Annual Report for 2008 (http://www.tuaspower.com.sg/annual8.asp) has mentioned that "In December 2008, we commissioned a new gas compressor 	

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	<p>that would allow our CCPs to operate in a wide range of gas supply pressures.”. Gas pressure problems have been plaguing Singapore for well over a year. It is therefore reasonably expected that a new entrant would install a gas compressor. Due to system security issues, a new entrant may need to run a gas compressor for its CCGTs so as to avoid having to de-load and/or hot-switch to diesel. A new entrant may need to run its gas compressor several times a week if not more frequently.</p>	
HEAT RATE		
5	<p><u>Island Power Company</u></p> <ul style="list-style-type: none"> • The heat rate is understated by PA for the following reasons: <ul style="list-style-type: none"> a. Auxiliary load of gas compressor has not been accounted for; b. There is no provision for compressor fouling on plant efficiency; and c. As pointed out above, Fig 1 (Form of CCGT non-recoverable degradation) is not correct. <p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> • From page 22, PA Consulting has omitted the inclusion of house load in derivation of the net heat rate. It is noted that PA Consulting has used a Net HR (clean-as-new, reference conditions) figure which includes boiler blow-down and step-up transformer losses but in the KEMA Report, that too was included but there was an additional 2% adjustment due to house load. PA 	<ul style="list-style-type: none"> • PA Consulting has reviewed the need for the inclusion of gas compressors by taking into account Singapore's gas pressure profile and the number of hours during which the gas compressors were expected to be running. The impact of gas compressors has been incorporated in the final report. • The revised report includes a discussion that includes compressor fouling in Section 3.2. A comparison with the earlier reports is included in Appendix G. We have recalculated the weighted average degradation allowances using the latest WACC. These now come to -2.42% power and +1.75% Heat Rate. • These have been compared with the KEMA allowances with and without the impact of the zero-hour rebuild allowed by KEMA and they are consistent with these. Reconciliation is included in Appendix G. The allowances provided for Heat Rate degradation are not less than the earlier allowances, including if KEMA's "Zero hour" refurbishment at Year 12 were replaced by a regular overhaul. In both cases both recoverable and non-recoverable

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	<p>Consulting's calculation of the net HR does not adequately take into account house load.</p> <p><u>Tuas Power Generation</u></p> <ul style="list-style-type: none"> We note the draft report stated that no consideration for additional allowance of regulation service was made on the basis that the AGC requirement in Singapore is not materially different from other jurisdictions. We would like to add that Singapore is a much smaller system than "other jurisdictions" where normal range of frequency deviations is likely to be an order of magnitude higher than other jurisdictions (+/- 0.1 H to 0.2Hz). Plants responding to AGC regulation service in Singapore are likely to be fluctuating within a much larger band than plants in other jurisdictions with the attendant negative impact on heat rate. The consultant should state which other jurisdictions are being used as comparison and show the normal frequency deviation trace over a say 10 minute interval to substantiate the assumption. We note the consultant nor the report have not fully addressed stakeholders' concerns on impact of heat rate due to compressor fouling. 	<p>degradation factors have been addressed, including of compressor fouling</p> <ul style="list-style-type: none"> The house load (or auxiliary load, or parasitic load) and the transformer losses (0.5%) have been accounted for (refer to Table 11 of the revised report). These have been calculated using GTPro software, which is recognised in the industry. The impacts of blow-down have been accounted for in the GTPro software analysis (1% of steam flow) The part load impact is accounted for already. Adjusting for the small perturbations caused by system frequency fluctuations and AGC operation is not a separately recognised factor. Small frequency perturbations occur on all systems and the impact on heat rate is not sufficiently material to warrant a separate factor. To the extent this creates a change in Heat Rate it would be second or third order and covered by other allowances. The previous 0.5% allowance appears excessive.
CAPACITY		
6	<p><u>Island Power Company</u></p> <ul style="list-style-type: none"> The allowance for degradation on capacity and heat rate in Fig 1 (Form of CCGT non-recoverable degradation) is wrong. It shows a 	<ul style="list-style-type: none"> The nomenclature on overhaul type varies and a compressor scour could be done at 24,000h or 48,000h depending on condition and value. If a

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	<p>maintenance cycle of 50,000 operating hours (which is 6 years) and not 24,000 EOH for F-class GT. As a result, it understates the average degradation on both capacity and heat rate.</p> <ul style="list-style-type: none"> Fouling of the compressor due to moisture and dirt in intake air has a profound impact on capacity (and also on heat rate). It can degrade the output by 3 – 4% (and heat rate by 1.5 – 2%) until an offline compressor wash is performed. This is not taken into account by PA. <p><u>PowerSeraya</u></p> <ul style="list-style-type: none"> On Page 18 of the Draft Report, PA Consulting has adjusted the generation capacity by -2.5% and the heat rate by -1.5%, to take into account average degradation. From the report by KEMA dated 20 October 2009 and titled “LRMC of CCGT generation in Singapore for technical parameters used for setting the vesting Price for the period 1 January 2009 to 31 December 2010” (“KEMA’ Report”), KEMA’s estimates were fairly close but KEMA had assumed a major life time extension after 12 years. If the major life time extension were not done, KEMA’s estimates for generation capacity and heat rate degradation would be expected to be significantly higher than PA Consulting’s. PA Consulting has not assumed a major life time extension. It is surprising that there is such a significant difference. PA Consulting’s adjustment of -1.5% to generation capacity to 	<p>compressor scour were undertaken every three years instead of every six the degradation amounts would be typically less than has been allowed. Degradation rates are highly site specific and depend on operator practices. The allowances used are considered typical. They are similar to what was used in previous reports and indeed are slightly higher than the KEMA values, even after allowing for the “zero hour” rebuild allowed by KEMA after 12 years. It appears that KEMA had assumed a 12 year cycle for compressor overhaul.</p> <ul style="list-style-type: none"> The calculations must use average degradations. The degradations have been accounted for. The revised report includes a discussion that includes compressor fouling in Section 3.2. A comparison with the earlier reports is included in Appendix G. We have recalculated the weighted average degradation allowances using the latest WACC. These now come to -2.42% power and +1.75% Heat Rate. These have been compared with the KEMA allowances with and without the impact of the zero-hour rebuild allowed by KEMA and they are consistent with these. Reconciliation is included in Appendix G. The allowances provided for Heat Rate degradation are not less than the earlier allowances, including if KEMA’s “Zero hour” refurbishment at Year 12 were replaced by a regular overhaul. In both cases both recoverable and non-recoverable degradation factors have been addressed, including of compressor fouling KEMA’s correction to 32°C was from ISO, whereas the current correction is from 29.5°C.

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	<p>take into account that registration is at 32 degrees Celsius is a lot lower than the -8% given in the KEMA Report. PowerSeraya would appreciate an explanation as to the differences.</p>	
ECONOMIC LIFE		
7	<p><u>Sembcorp Cogen</u></p> <ul style="list-style-type: none"> PA Consulting commented that “utility bond spreads were used in the 2007-2008 review, the 2009-2010 review and the mid-term 2010 review to set the debt premium with no additional quantum ever added. In seeking to provide a WACC value consistent with previous vesting prices, PA Consulting has applied the same methodology...”. Using this consistency approach, shouldn't PA Consulting be keeping the economic life of the plant at 20 years and not use the market modelling to determine the Economic Life of the plant instead? 	<ul style="list-style-type: none"> In order for PA Consulting to adopt an approach that is consistent with the methodology of previous reviews, PA must be in agreement with the past methodology. In the case of economic life, this parameter is clearly dependent on future market conditions, so we cannot agree with a methodology that does not include modelling of future market conditions. It was assumed in the previous review that the plant is refurbished after 12 years of operation. The refurbishment extended the economic life to 24 years; and the residual value beyond 20 years taking into account as a reduction to the capital costs. This in effect meant that the assumed life is 24 years, not 20 years (see KEMA's Report for EMA, "LRMC of CCGT generation in Singapore for technical parameters used for setting the Vesting Price for the period 1 January 2009 to 31 December 2010", dated 22 June 2009). The model used by PA Consulting to determine the economic life also supports the 24 year economic life. The model does factor in the assumption that plants built in the future will be incrementally more efficient than those that are built now. This is clearly stated in the assumptions. Indeed we would point out that one of the Gencos have indicated to EMA that its proposed new CCGT would have an economic life of 30 years.

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	<ul style="list-style-type: none"> In the Singapore market, the last generation of plant that is used are the fuel-fired steam plants. The past record would show that these plants do not have an economic life of more than 20 years and even Senoko plans to re-powered their CCGT after less than 20 years. As such, there really isn't any reason why there should be an increase in the economic life of the plant to more than 20 years. 	<ul style="list-style-type: none"> The economic life of old oil-fired steam plant is not a valid basis for determining the economic life of a new CCGT plant. Similarly, we do not believe the repowering plans for a single existing CCGT station are a valid basis for determining the economic life of new CCGTs in general. There is no technical reason to limit the life of a CCGT to 20 years, and our modelling indicates a 24-year economic life for these technologies in the Singapore market.
VARIABLE NON-FUEL COST		
8	<p><u>Tuas Power Generation</u></p> <ul style="list-style-type: none"> We note the error in the unit used for the computation of the EMA licence fee 	<ul style="list-style-type: none"> EMA confirms that a generation licensee is subject to an initial licence fee of S\$50,000 when the licence was granted and an annual licence fee comprising of a fixed fee of \$50,000 and a variable fee of S\$155 × amount of electricity generated in GWh by the Generation Licensee in the preceding calendar year. The allowance for generation licence fee under the variable non-fuel cost component will be adjusted accordingly.