Notice of Market Rules Modification

Paper No.:	EMC/RCP/27/2006/256
Rule reference:	Section 4.4 and 2.1.2 of Chapter 7
Proposer:	Market Administration, EMC
Date received by EMC:	29 May 2006
Category allocated:	2
Status:	Approved by EMA
Effective Date:	7 September 2006

Summary of proposed rule modification:

This proposal is to ignore negative Injection Energy Quantities (IEQs) in determining price neutralisation payments for embedded generation facilities and their associated load.

Date considered by Rules Change Panel:	4 July 2006
Date considered by EMC Board:	27 July 2006
Date considered by Energy Market Authority:	23 August 2006

Proposed rule modification:

See attached paper.

Reasons for rejection/referral back to Rules Change Panel (if applicable):

PAPER NO.	:	**EMC/BD/04/2006/03(b)**
RCP PAPER NO.	:	**EMC/RCP/27/2006/256**
SUBJECT	:	**TREATMENT OF NEGATIVE IEQ IN PRICE NEUTRALISATION**
FOR	:	**DECISION**
PREPARED BY	:	**JANICE LEOW** **ECONOMIST**
REVIEWED BY	:	**PAUL POH LEE KONG** **SVP, MARKET ADMINISTRATION**
DATE OF MEETING	:	**27 JULY 2006**

Executive Summary

EMC has proposed that negative IEQs (Injection Energy Quantities) be ignored in determining price neutralisation payments for each group of Embedded Generation Facilities and its associated load. The proposal provides a consistent treatment of negative IEQ independent of which price neutralisation payment is applicable. EMC's settlement systems would have to be modified to implement this change. Implementation is estimated to take five business days. The RCP recommends that the EMC Board **adopt** this proposal.

1.   Introduction

This paper assesses EMC's rule modification proposal to ignore negative IEQs (Injection Energy Quantities) in determining price neutralisation payments for energy settlement in Section 4.4 of Chapter 7 of the Market Rules (see Annex 1).

2.   Background

The Singapore wholesale electricity market was designed as a gross pool: any organisation that intended to produce energy (from a generator of 1MW capacity or greater) would be required to sell this energy into the market; any organisation that intended to purchase energy would be required to buy this energy from the market.

The Singapore wholesale electricity market also adopted "partial" nodal pricing for energy: generators would be settled using MEPs (Market Energy Prices) at the MNNs (Market Network Nodes) corresponding to their points of injection, but loads would be settled using the sum of USEP[1] and HEUC[2].

Hence, in energy settlement for an organisation with embedded generators[3] and associated load, different prices would apply to the IEQ of the embedded generators and to the WEQ (Withdrawal Energy Quantity) of the associated load. For example, the organisation shown in Figure 1 would receive GESC less LESD, where:

GESC (Generation Energy Settlement Credit) $= IEQ1 \times MEP1 + IEQ2 \times MEP2$

– LESD (Load Energy Settlement Debit) $= - WEQ \times (USEP + HEUC)$

Figure 1: Energy settlement under partial nodal pricing (without price neutralisation)
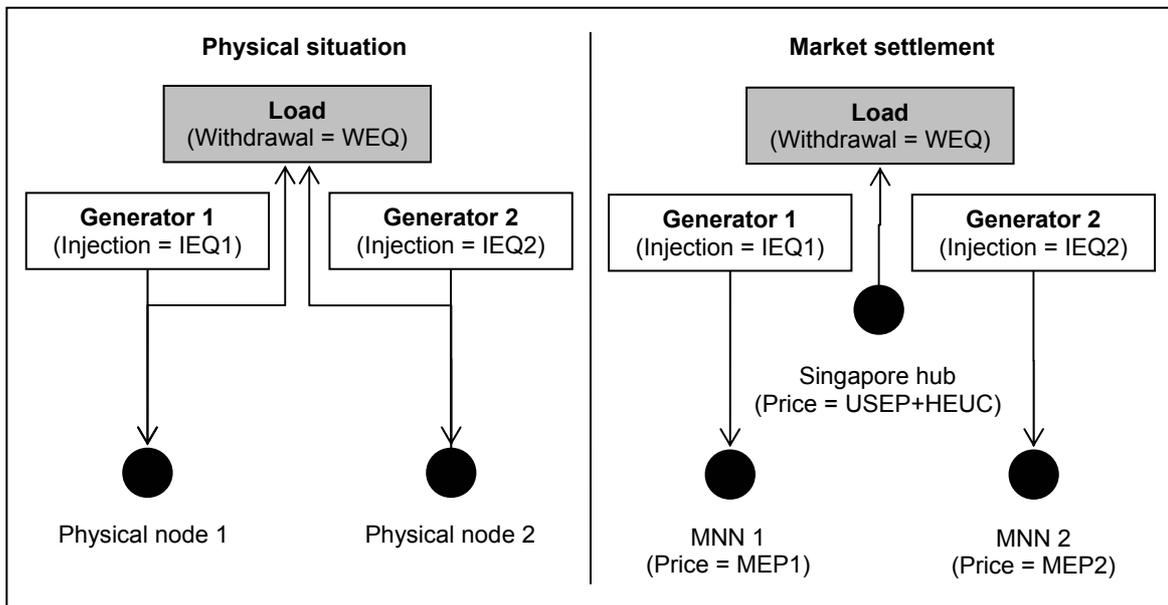
With "full" nodal pricing for energy, where loads are also settled using nodal prices, energy settlement would effectively be on a net basis at each MNN since the sale and purchase prices would be the same or very similar. This is because the injection and consumption nodes would either be identical or so close together that network constraints would not result

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[1] USEP (Uniform Singapore Energy Price) is the volume-weighted average of prices at all withdrawal nodes.

[2] HEUC (Hourly Energy Uplift Charge) is the settlement interval deficit (surplus) that is charged (credited) to loads in proportion to their energy withdrawals in the settlement interval.

[3] An embedded generator is a generator that generates electricity for its own consumption.

in significantly different prices at the nodes. However, with "partial" nodal pricing, network constraints could mean that the organisation would receive significantly different MEPs for its generation compared to (USEP+HEUC) that it would pay for its consumption. Thus, the organisation could end up paying out for the energy it generated for its own consumption. When this was recognised, provisions were put into the Market Rules to allow the neutralisation of price differentials for equivalent quantities of injection by each (EMA-authorised) group of Embedded Generation Facilities and withdrawal by its associated load.

Price neutralisation

Price neutralisation under the current Market Rules involves paying each group of Embedded Generation Facilities an additional NELC or NEGC (on top of GESC less LESD), depending on how its associated load compares with the group's injection. Continuing the example in Figure 1, price neutralisation payments would be as follows.

Figure 2: Price neutralisation payments
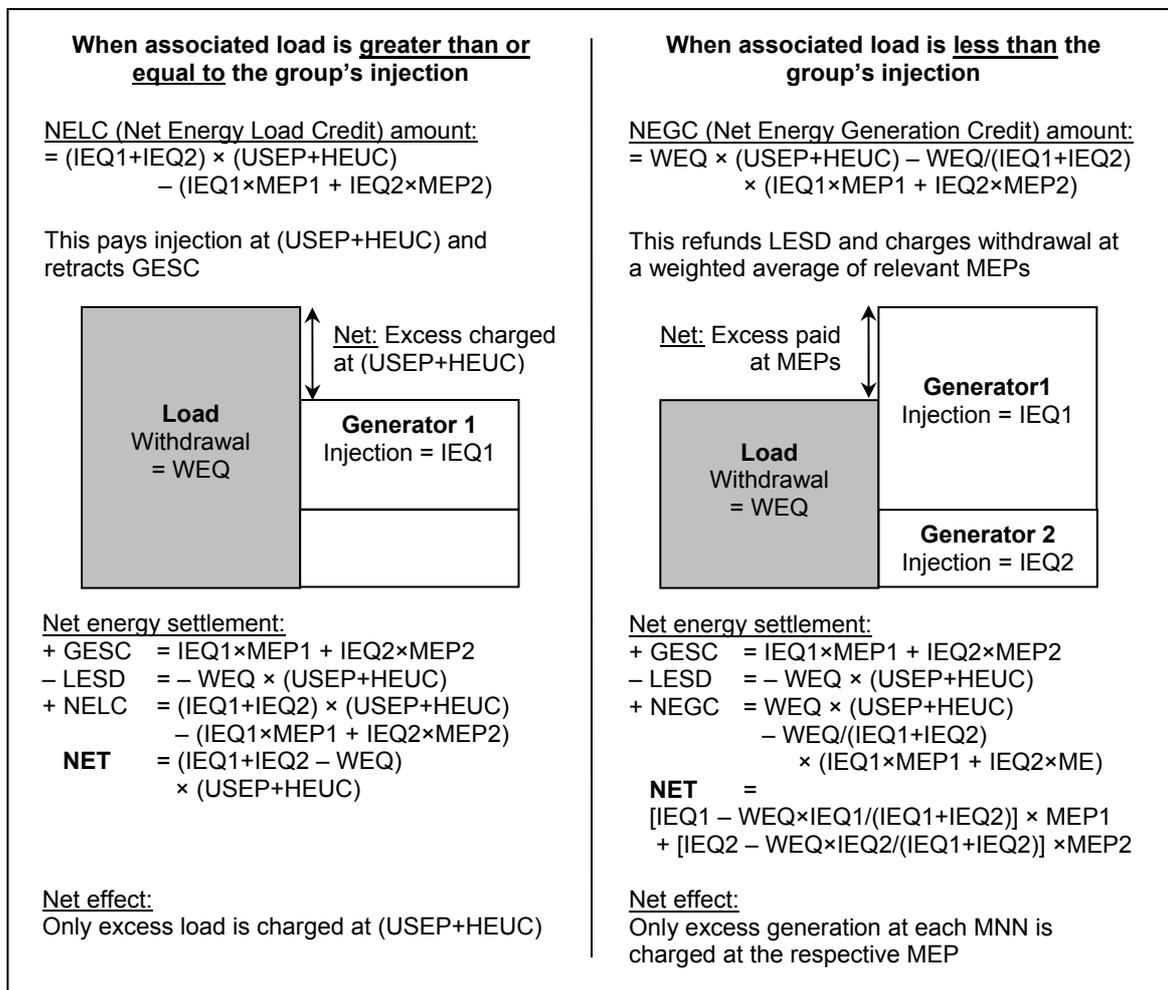
The purpose of price neutralisation is to allow embedded generators that generate electricity for its own consumption to offset generation against/by their associated load so that only excess generation at each MNN is paid at the respective MEP or excess load is charged at (USEP+HEUC) in energy settlement.

The formulas for calculating price neutralisation payments in the current Market Rules equally apply to both positive and negative IEQ values. Negative IEQ values arise when a generator is not generating, but is drawing a small amount of electricity from the grid at its node. This

withdrawal is reflected as a negative IEQ value in the metering data provided by the Market Support Services Licensee to EMC for use in settlement.
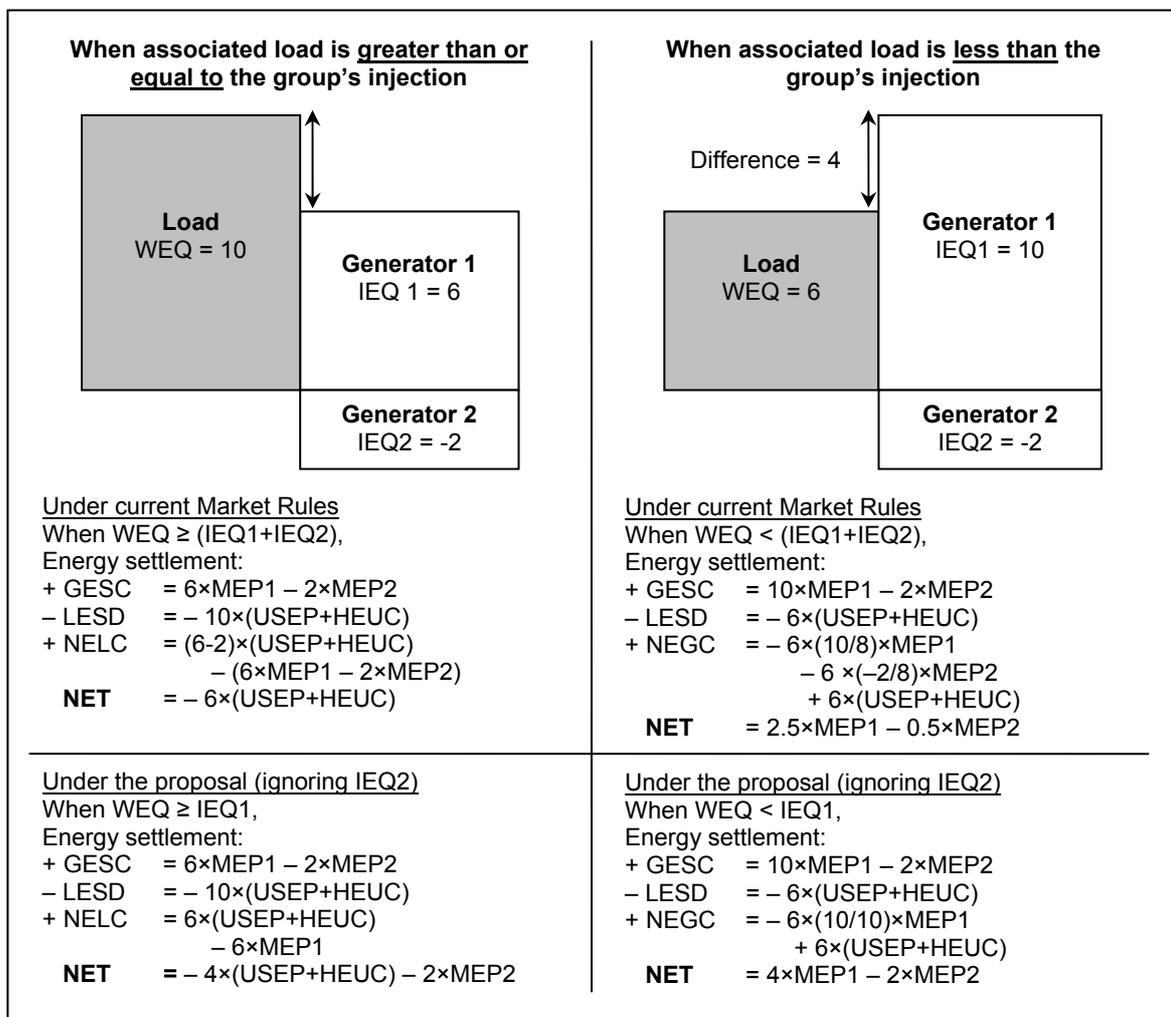
EMC has proposed that negative IEQs of Embedded Generation Facilities be ignored in determining price neutralisation payments. This is because the treatments of negative IEQ differ depending on which price neutralisation payment is calculated, and individually the treatments are also inappropriate. This is explained further in section 3.

3. Analysis

Under EMC's rule modification proposal to ignore negative IEQs in determining price neutralisation payments, negative IEQs of a group Embedded Generation Facilities will solely be charged at the relevant MEP; associated load's WEQ will only be offset against/by positive IEQs of the group Embedded Generation Facilities so that the excess generation at each MNN will be paid at the respective MEP or excess load is charged at (USEP+HEUC).

Figure 3 illustrates the difference in net energy settlement under the current Market Rules and under EMC's rule modification proposal.

Figure 3: Net energy settlement with negative IEQ

When associated load is <u>greater than or equal to</u> the group's injection	When associated load is <u>less than</u> the group's injection
Load WEQ = 10	**Load** WEQ = 6
Generator 1 IEQ 1 = 6	**Generator 1** IEQ1 = 10
Generator 2 IEQ2 = -2	Difference = 4 / **Generator 2** IEQ2 = -2

Under current Market Rules
When WEQ ≥ (IEQ1+IEQ2),
Energy settlement:

+ GESC   = 6×MEP1 – 2×MEP2
– LESD   = – 10×(USEP+HEUC)
+ NELC   = (6-2)×(USEP+HEUC)
                 – (6×MEP1 – 2×MEP2)
  NET   = – 6×(USEP+HEUC)

Under current Market Rules
When WEQ < (IEQ1+IEQ2),
Energy settlement:

+ GESC   = 10×MEP1 – 2×MEP2
– LESD   = – 6×(USEP+HEUC)
+ NEGC   = – 6×(10/8)×MEP1
                 – 6 ×(–2/8)×MEP2
                 + 6×(USEP+HEUC)
  NET   = 2.5×MEP1 – 0.5×MEP2

Under the proposal (ignoring IEQ2)
When WEQ ≥ IEQ1,
Energy settlement:

+ GESC   = 6×MEP1 – 2×MEP2
– LESD   = – 10×(USEP+HEUC)
+ NELC   = 6×(USEP+HEUC)
                 – 6×MEP1
  NET   **=** – 4×(USEP+HEUC) – 2×MEP2

Under the proposal (ignoring IEQ2)
When WEQ < IEQ1,
Energy settlement:

+ GESC   = 10×MEP1 – 2×MEP2
– LESD   = – 6×(USEP+HEUC)
+ NEGC   = – 6×(10/10)×MEP1
                 + 6×(USEP+HEUC)
  NET   = 4×MEP1 – 2×MEP2

Current treatment of negative IEQ

With an NELC payment, negative IEQ at an MNN is effectively treated as associated load withdrawal and priced at (USEP+HEUC) instead of MEP. This is inappropriate because negative IEQ is actually withdrawal that applies to a generator and thus should be priced at MEP instead of (USEP+HEUC) as consistent with the treatment of negative IEQ of all other generators. The classification of a generator as an embedded generator should not change the treatment of its IEQ when negative while the treatment of negative IEQ for other generators remains unchanged.

With an NEGC payment, negative IEQ is partially used to offset generation at other MNNs, with the remainder charged at the relevant MEP. The proportions vary according to how the magnitude of the negative IEQ compares with the magnitude(s) of all the other IEQ(s) of the Embedded Generation Facilities in the group. There is simply no basis for this mixed and varying treatment of negative IEQ.

The proposal

Under EMC's proposal for negative IEQs to be excluded from price neutralisation, negative IEQs are treated in the same way no matter which type of price neutralisation payment is due and the charging for negative IEQ (at the relevant MEP) is consistent with the treatment of all other (non-embedded) Generation Registered Facilities' negative IEQs.

Rule changes

Principally, to implement the proposal to ignore negative IEQs in determining price neutralisation payments for energy settlement, changes to Section 4.4 of Chapter 7 of the Market Rules are required. The rule modification proposal to amend this section and the ancillary rule modifications are given in Annex 1 and Annex 2 respectively.

Additional changes correct typographical or notational errors, improve clarity and consistency with other sections of the Market Rules, or are consequential amendments arising from re-drafting. The following changes are noteworthy.

Section of proposed rules (existing rules)	Rule change	Reason for change
4.4.3.1 (4.4.2)	Additional requirement to only allow generation facilities of the same generation licensee to be assigned to the same group.	Generation facilities assigned to the same group would also be assigned the same settlement account (new section 4.4.5; existing section 4.4.2).
		Since a settlement account should only be associated with one generation licensee (section 2.1.2.1), this change clarifies that generation facilities of different generation licensees cannot be assigned to the same group.
4.4.8 (4.4.6)	Express the payment or recovery of NEGC and NELC as amounts to be "included in that market participant's preliminary settlement statement"	Although both provisions are similar, they are currently worded differently.
		These changes structure the provisions similarly, and align terminology with that used in section 5.4.2 ("preliminary settlement statements related to each market participant … shall include … (various debits/credits determined by EMC)").
4.4.11 (4.4.9)	Express the recovery of NEAD as an amount to be "included in that market participant's preliminary settlement statement"	

4. Conclusion

The proposal to ignore negative IEQ in determining price neutralisation payments in energy settlement provides a consistent treatment of negative IEQ independent of which price neutralisation payment is applicable.

5. Impact on market systems

The settlement system operated by EMC would have to be modified to ignore negative IEQ values of Embedded Generation Facilities when determining whether an NEGC or NELC payment is applicable and when calculating the payments for price neutralisation.

There will be no impact on other market systems.

6. Implementation process

The required functionality in EMC's settlement system to implement this change has already been developed at the cost of $7,800. EMC estimates that the required changes to the settlement system can be implemented within five business days of notification.

7. Consultation

We have published the rule modification proposal on the EMC website for comments. No comments have been received for consideration.

8. Legal sign off

Text of the proposed rule modifications has been vetted by EMC's external legal counsel whose opinion is that the proposed changes to the existing sections 2.1.2 and 4.4.1 to 4.4.3, 4.4.6 and 4.4.9 of Chapter 7 of the Market Rules reflect the intent as expressed in the third columns of Annex 1 and Annex 2.

EMC's external legal counsel has indicated that their opinion does not extend to the proposed changes to the existing sections 4.4.4, 4.4.5, 4.4.7 and 4.4.8 of Chapter 7.

9. Recommendations

The RCP unanimously recommends that the EMC Board:

a.   **adopt** the rule modification proposal to amend Section 4.4 of Chapter 7 of the Market Rules and ancillary rule modifications to Chapter 7, as set out in the Annex 1 and Annex 2;

b.   **seek** the Authority's approval for the rule modification proposal; and

c.   **recommend** that the rule modification proposal come into force **five business days** after the date on which the approval of the Authority is published by the EMC.

Annex 1: Proposed rule modifications

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
4.4 (USEP+HEUC)/NODAL PRICE NEUTRALISATION	**4.4 (USEP+HEUC)/NODAL PRICE NEUTRALISATION**	
Explanatory note: This section applies to an applicable market participant of the generation licensee class authorised by the Authority as defined in Section 4.4.1. Each group of embedded generation facilities and the associated load will be assigned one settlement account.	**Explanatory note: This section applies to an applicable market participant of the generation licensee class authorised by the Authority as defined in Section 4.4.1. Each group of embedded generation facilities and the associated load will be assigned one settlement account.**	
4.4.1 A *generation licensee* having *generation facility* which generates *electricity* for the consumption of that *generation licensee* and/or its *related corporations* is eligible to apply to the *Authority* for authorisation for the purpose of this section, provided that:	4.4.1 A *generation licensee* having a_ *generation facility* which generates *electricity* for the consumption of that *generation licensee* and/or its *related corporations* is eligible to apply to the *Authority* for authorisation for the purpose of this section, provided that:	To correct typographical errors.
4.4.1.1 consumption by the *generation licensee* and/or its related corporations of electricity generated by the *generation licensee* occurs	4.4.1.1 such consumption ~~by the *generation licensee* and/or its *related corporations*~~ of *electricity* ~~generated by the *generation licensee*~~ occurs:	To clarify that the existing limbs (i) and (ii) describe the location of consumption of electricity (and not the location of generation of electricity).
(i) on the same physical site as the site of such *generation facility*; or	4.4.1.1~~(i)~~ on the same physical site as the site of such *generation facility*; or	

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
(ii) on the physical site that is (1) majority owned by the *generation licensee* or any of its *related corporations*; and (2) immediately adjacent and contiguous to the site of such *generation facility*	4.4.1.2 ~~(ii)~~ on the physical site that is: a.~~(1)~~ majority owned by the *generation licensee* or any of its *related corporations*; and b.~~(2)~~ immediately adjacent and contiguous to the site of such *generation facility*.	
4.4.2 Upon authorisation granted by the *Authority* referred to in section 4.4.1, the *generation facility* which satisfies the conditions in sections 4.4.1.1 (i) & (ii) above will be classified as an embedded *generation facility*. Embedded *generation facilities* will be assigned a group which can only contain embedded *generation facilities*. Embedded *generation facilities* can only be assigned the same group if they are on the same physical site or immediately adjacent and contiguous to each other's sites. In addition, embedded *generation facilities* that are on the same physical site or immediately adjacent and contiguous to each other's will be assigned the same group. Each group of embedded *generation facilities* with the associated *load*	4.4.2 Upon authorisation granted by the *Authority* referred to in section 4.4.1, the *generation facility* which satisfies the conditions in sections 4.4.1.1 or 4.4.1.2 shall ~~(i) & (ii) above will~~ be classified as an embedded *generation facility*. 4.4.3 The *Authority* shall assign each embedded *generation facility* to a group containing only embedded *generation facilities*. Two or more embedded *generation facilities* shall be assigned the same group if and only if: 4.4.3.1 they are *generation facilities* of the same *generation licensee*; and 4.4.3.2 they are on the same physical site or on physical sites that are	To clarify that only one of section 4.4.1.1 or 4.4.1.2 needs to be satisfied. To clarify that the grouping of embedded generation facilities shall be carried out by the Authority. To clarify that embedded generation facilities may only be grouped together in

Existing rules (Release: 1 April 2006)		Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)		Reasons for modification
	will be allocated a separate *settlement account*.		immediately adjacent and contiguous to each other. ~~Embedded *generation facilities* will be assigned a group which can only contain embedded *generation facilities*. Embedded *generation facilities* can only be assigned the same group if they are on the same physical site or immediately adjacent and contiguous to each other's sites. In addition, embedded *generation facilities* that are on the same physical site or immediately adjacent and contiguous to each other's will be assigned the same group. Each group of embedded *generation facilities* with the associated *load* will be allocated a separate settlement account.~~	the same group if: (a) they are the facilities of the same generation licensee; and (b) they satisfy the conditions in the new section 4.4.3.2. Explanatory note: The last sentence of the existing section 4.4.2 has been moved to the new section 4.4.5.
4.4.3	The consumption by the *generation licensee* with regard to the relevant *generation facilities* that meets the conditions set out in section 4.4.1.1 will be identified and classified as the associated *load* for the relevant group of embedded *generation facilities*.	4.4.~~4~~3	~~The c~~Consumption of *electricity* ~~by the generation licensee with regard to the relevant generation facilities~~ that meets the conditions set out in section 4.4.1.1 or 4.4.1.2 with regard to a group of embedded *generation facilities* shall ~~will~~ be ~~identified and~~ classified as the associated *load* for that ~~the relevant~~ group ~~of embedded generation facilities~~.	To clarify that only one of section 4.4.1.1 or 4.4.1.2 needs to be satisfied.
(4.4.2	… Each group of embedded *generation facilities* with the associated *load* will be	4.4.5	Each group of embedded *generation facilities* and its associated *load* shall collectively be	Explanatory note: The new section 4.4.5 is

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
allocated a separate *settlement account*.)	assigned one *settlement account.*	based on last sentence of the existing section 4.4.2. To clarify that the group of embedded generation facilities and its associated load are collectively assigned only one settlement account. "Allocated" is replaced with "assigned" for consistency with the existing section 4.4.4.
4.4.4 The *EMC* shall calculate the Net Energy Load Credit for a group of embedded *generation facilities* if the group of embedded *generation facilities'* associated *load* in a *settlement interval* is greater than or equal to the group of embedded *generation facilities'* injection into the grid in that *settlement interval*. $$\text{NELC}_h^{sa} = \sum_{m(sa)} [\text{IEQ}_h^m \times (\text{USEP}_h + \text{HEUC}_h - \text{MEP}_h^m)]$$	4.4.6̶4̶ <u>For each *settlement interval*, if the sum of positive injections of a group of embedded *generation facilities* into the *transmission system* is less than or equal to its associated *load*, t</u>T̶he *EMC* shall ~~calculate~~ <u>determine</u> the N̶<u>n</u>et E̶<u>*energy*</u> L̶<u>*load*</u> C̶<u>c</u>redit <u>(NELC)</u> for <u>that</u> a̶ group ~~of embedded *generation facilities* if the group of embedded *generation facilities'* associated *load* in a *settlement interval* is greater than or equal to the group of embedded~~	To effect rule change for negative IEQs to be ignored – it is inconsequential if IEQs of zero are ignored also. The reference to "grid" in the existing section 4.4.4 should

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
where: NELC = Net Energy Load Credit for a *settlement account* sa in *settlement interval* h $\sum_{m(sa)}$ represents a summation over all *MNNs* belonging to *settlement account* sa assigned to the group of embedded *generation facilities* IEQ_h^m = *energy* injected into *MNN* m in *settlement interval* h MEP_h^m = *Market Energy Price* for *MNN* m in *settlement interval* h $USEP_h$ = the *Uniform Singapore Energy Price* in *settlement interval* h	~~*generation facilities*' injection into the grid in that *settlement interval*~~ <u>as follows:</u> $NELC_h^{sa} = \sum_{m(sa)} [IEQ_h^{m(sa)} \; \underline{\times} \; (USEP_h + HEUC_h - MEP_h^{m(sa)})]$ where: <u>sa = the *settlement account* assigned to that group</u> <u>h = the *settlement interval*</u> ~~NELC = Net Energy Load Credit for a *settlement account* sa in *settlement interval* h~~ $\sum_{m(sa)}$ <u>= sum</u> ~~represents a summation~~ over all *MNNs* <u>m(sa) associated with</u> ~~belonging to~~ *settlement account* sa ~~assigned to the group of embedded *generation facilities*.~~ <u>excluding *MNNs* at which the injection *energy* quantity for *settlement interval* h is negative</u> ~~IEQ_h^m = *energy* injected into *MNN* m in *settlement interval* h~~ ~~MEP_h^m = *Market Energy Price* for MNN m~~	be a reference to the "transmission system". "Calculate" is replaced with "determine" for consistency with the rest of Chapter 7. To correct notational errors; to explain notation used; to delete explanations for notation already given in section 2.2 (as consistent with the rest of Chapter 7).

Existing rules (Release: 1 April 2006)		Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)		Reasons for modification
			in *settlement interval* h	
			USEP~~h~~ = the *Uniform Singapore Energy Price* in *settlement interval* h	
4.4.5	The *EMC* shall, in accordance with the procedure outlined in sections 4.4.5.1 to 4.4.5.4, calculate the Net Energy Generation Credit if the group of embedded *generation facilities'* associated *load* in a *settlement interval* is smaller than the group of embedded *generation facilities'* injection into the grid in that *settlement interval*.	4.4.~~5~~7	For each *settlement interval, if the sum of positive injections of a group of embedded generation facilities into the transmission system is greater than its associated load,* t~~The~~ *EMC* shall~~, in accordance with the procedure outlined in sections 4.4.5.1 to 4.4.5.4, calculate~~ determine the ~~N~~net ~~E~~*energy* ~~G~~generation ~~C~~credit (NEGC) for that ~~if the~~ group ~~of embedded generation facilities' associated load in a settlement interval is smaller than the group of embedded generation facilities' injection into the grid in that settlement interval.~~ in accordance with sections 4.4.7.1 to 4.4.7.4.	To effect rule change for negative IEQs to be ignored. The reference to "grid" in the existing section 4.4.4 should be a reference to the "transmission system". "Calculate" is replaced with "determine" for consistency with the rest of Chapter 7.
4.4.5.1	For each *settlement account* assigned to a group of embedded *generation facilities*, *EMC* will rank the *MNNs* belonging to that *settlement account* in increasing size of *energy* generated at each *MNN* in	4.4.~~5~~7.1	~~For each settlement account assigned to a group of embedded generation facilities,~~ The *EMC* shall ~~will~~ rank all ~~the~~ *MNNs* associated with the ~~belonging to that~~ *settlement account* assigned to that group	To effect rule change for negative IEQs to be ignored. To improve clarity.

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settlement interval h. **Explanatory Note: The ranking of the Market Network Nodes is meant to be used to identify the Market Network Nodes so that allocation of withdrawal quantities to the nodal prices at the respective Market Network Nodes can be done. It is not for indication of any preference shown by ranking. The allocation of the withdrawal quantity to the nodal prices of the Market Network Nodes is based on the IEQs of the Market Network Nodes. The allocation methodology is on a proportionate basis with nodal prices of Market Network Nodes having greater injection quantities being assigned a greater withdrawal quantity, the quantity assigned being the total withdrawal quantity multiplied by the fraction of total injection that is being injected at the particular Market Network Node.**	(excluding <u>*MNNs* at which the injection *energy* quantity for the *settlement interval* is negative) in</u> increasing ~~size of~~ <u>injection *energy* quantity</u> ~~generated~~ at each *MNN* in the *settlement interval* ~~h.~~<u>, such that:</u> <u>z = the index position of the ranked *MNN*</u> <u>m(z) = the *MNN* ranked at index position z</u> **Explanatory Note: The ranking of the Market Network Nodes is meant to be used to identify the Market Network Nodes so that allocation of withdrawal quantities to the nodal prices at the respective Market Network Nodes can be done. It is not for indication of any preference shown by ranking. The allocation of the withdrawal quantity to the nodal prices of the Market Network Nodes is based on the IEQs of the Market Network Nodes. The allocation methodology is on a proportionate basis with nodal prices of Market Network Nodes having greater injection quantities being assigned a greater withdrawal quantity, the quantity assigned being the total withdrawal quantity multiplied by the fraction of total injection that is being injected at**	

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		the particular Market Network Node.		
4.4.5.2	*EMC* will determine an index size function S(z) such that: S(z) = *energy* injected at the *MNN* ranked at index position z for the *settlement account* sa S(z) <= S(z+1)	4.4.~~5~~7.2	The *EMC* shall ~~will~~ determine an index size function S(z) such that: S(z) = <u>injection</u> *energy* <u>quantity</u> ~~injected~~ at the *MNN* ranked at index position z <u>under section 4.4.7.1</u> ~~for the *settlement account* sa~~ S(z) ~~<=~~<u>≤</u> S(z+1)	To improve clarity.
4.4.5.3	To apportion the withdrawal quantity in *settlement interval* h between the nodal prices *(MEP)* at each of the *MNNs* for the *settlement account* sa, *EMC* will determine T(z) such that: $T(z) = S(z)/\sum_{j=1}^{Z} S(j)$ Z = total number of *MNNs* for *settlement account* sa	4.4.~~5~~7.3	~~To apportion the withdrawal quantity in *settlement interval* h between the nodal prices (MEP) at each of the *MNNs* for the *settlement account* sa,~~ The *EMC* shall ~~will~~ determine T(z) such that: $T(z) = S(z)/\sum_{j=1}^{Z} S(j)$ Z = total number of *MNNs* for *settlement account* sa<u>, excluding *MNNs* at which the injection *energy* quantity for the *settlement interval* is negative</u>	To delete partial explanation of the NEGC calculation process here (since the explanatory note above already explains the whole process). To align with rule change for negative IEQs to be ignored.

Existing rules (Release: 1 April 2006)		Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)		Reasons for modification
4.4.5.4	*EMC* will calculate the Net Energy Generation Credit (NEGC) for a group of embedded *generation facilities settlement account* sa for *settlement interval* h: $NEGC_h^{sa} = \sum_{z=1}^{Z}[T(z) \times (USEP_h + HEUC_h - MEP_h^{m(z)})] \times WEQ_h^{sa}$ where: WEQ_h^{sa} = withdrawal *energy* quantity (in MWh) for *settlement account* sa for *settlement interval* h Z = total number of *MNNs* for *settlement account* sa $MEP_h^{m(z)}$ = *Market Energy Price* at the *MNN* ranked at index position *z* in *settlement interval* h $USEP_h$ = *Uniform Singapore Energy Price* in *settlement interval* h	4.4.7̶5̶.4	The *EMC* shall determine w̶i̶l̶l̶ c̶a̶l̶c̶u̶l̶a̶t̶e̶ the N̶e̶t̶ ̶E̶n̶e̶r̶g̶y̶ ̶G̶e̶n̶e̶r̶a̶t̶i̶o̶n̶ ̶C̶r̶e̶d̶i̶t̶ (NEGC)̶ for that a̶ group o̶f̶ ̶e̶m̶b̶e̶d̶d̶e̶d̶ *g̶e̶n̶e̶r̶a̶t̶i̶o̶n̶ ̶f̶a̶c̶i̶l̶i̶t̶i̶e̶s̶ ̶s̶e̶t̶t̶l̶e̶m̶e̶n̶t̶ ̶a̶c̶c̶o̶u̶n̶t̶* s̶a̶ for the *settlement interval* h̶ as follows: $NEGC_h^{sa} = \sum_{z=1}^{Z}[T(z) \times (USEP_h + HEUC_h - MEP_h^{m(z)})] \times WEQ_h^{sa}$ where: sa = the *settlement account* assigned to that group h = the *settlement interval* W̶E̶Q̶_h̶^s̶a̶ ̶=̶ ̶w̶i̶t̶h̶d̶r̶a̶w̶a̶l̶ *e̶n̶e̶r̶g̶y̶* q̶u̶a̶n̶t̶i̶t̶y̶ ̶(̶i̶n̶ ̶M̶W̶h̶)̶ ̶f̶o̶r̶ *s̶e̶t̶t̶l̶e̶m̶e̶n̶t̶ ̶a̶c̶c̶o̶u̶n̶t̶* s̶a̶ ̶f̶o̶r̶ *s̶e̶t̶t̶l̶e̶m̶e̶n̶t̶ ̶i̶n̶t̶e̶r̶v̶a̶l̶* h̶ Z = total number of *MNNs* for *settlement account* sa, excluding *MNNs* at which the injection *energy* quantity for the *settlement interval* is negative	"Calculate" is replaced with "determine" for consistency with the rest of Chapter 7. To explain notation used; to delete explanations for notation already given in section 2.2 (as consistent with the rest of Chapter 7).

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
	MEP~h~^m(z)^ = *Market Energy Price* at the *MNN* ranked at index position *z* in *settlement interval* h ~~~~ USEP~h~ = *Uniform Singapore Energy Price* in *settlement interval* h	
4.4.6 *EMC* will pay NEGC and NELC associated with each *settlement account* and calculated for each *settlement interval*, to the applicable *market participant*. The *settlement statement* of the *market participant* will show the total NEGC and NELC to be credited to or debited from that *market participant* for that settlement day.	4.4.86 The NEGC and NELC determined for each *settlement interval* of a given *trading day* and payable to a given *market participant*, shall be aggregated and included in that *market participant's* preliminary *settlement statement* for that *trading day*. *EMC* will pay NEGC and NELC associated with each *settlement account* and calculated for each *settlement interval*, to the applicable *market participant*. The *settlement statement* of the *market participant* will show the total NEGC and NELC to be credited to or debited from that *market participant* for that settlement day.	To correct typographical errors and improve clarity. "Calculated" is replaced with "determined" for consistency with the rest of Chapter 7.
4.4.7 *EMC* will calculate the Net Energy Adjustment Amount (NEAA) for each *settlement interval* as follows:	4.4.97 The *EMC* will shall determine calculate the Nnet Eenergy Aadjustment Aamount (NEAA) for each *settlement interval* as follows:	To improve clarity. "Calculate" is replaced with "determine" for

Existing rules (Release: 1 April 2006)		Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)		Reasons for modification
	$NEAA_h = \sum_{sa}[NELC_h^{sa} + NEGC_h^{sa}]$ where: h = a *settlement interval* $\sum_{sa}$ = sum over all group of embedded *generation facilities settlement accounts*		$NEAA_h = \sum_{sa}[NELC_h^{sa} + NEGC_h^{sa}]$ where: h = a *settlement interval* $\sum_{sa}$ = sum over <u>the *settlement accounts* sa of</u> all group<u>s</u> of embedded *generation facilities* ~~settlement accounts~~	consistency with the rest of Chapter 7.
4.4.8	The *EMC* will calculate the Net Energy Adjustment Debit (NEAD) for *settlement interval* h, which shall be applied to all *market participants* who have withdrawn *energy* in *settlement interval* h. $NEAD_h^{sa} = NEAA_h \times [(WEQ_h^{sa} - R_h^{sa})/(\sum_j WEQ_h^j - \sum_l R_h^l)]$ where: h = a *settlement interval* sa = *settlement account* of a *market participant* who withdraws *energy* in *settlement interval* h WEQ_h^{sa} = withdrawal *energy* quantity for	4.4.10~~8~~	<u>For each *settlement interval*, t</u>~~T~~he *EMC* <u>shall determine</u> ~~will calculate~~ the <u>N</u>~~n~~et <u>E</u>~~e~~*nergy* <u>A</u>~~a~~djustment <u>D</u>~~d~~ebit (NEAD) ~~for *settlement interval* h, which shall be applied~~ <u>applicable</u> to <u>each</u> ~~all~~ *market participants* who <u>has</u> ~~have~~ withdrawn *energy* <u>from the *transmission system*</u> in <u>that</u> *settlement interval* ~~h.~~ <u>as follows:</u> $NEAD_h^{sa} = NEAA_h \times [(WEQ_h^{sa} - R_h^{sa})/(\sum_j WEQ_h^j - \sum_l R_h^l)]$ where: ~~h = a *settlement interval*~~ sa = *settlement account* of a *market participant* who <u>has withdrawn</u> ~~withdraws~~ *energy* in *settlement interval* h	To improve clarity. "Calculate" is replaced with "determine" for consistency with the rest of Chapter 7. To explain notation in a way that is consistent with the rest of Chapter 7

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
settlement account sa for *settlement interval* h $\sum_j WEQ_h^j$ = sum of withdrawal *energy* quantity over all *settlement accounts* for *settlement interval* h $R_h^{sa} = min(WEQ_h^{sa}, IEQ_h^{sa})$ if group of embedded *generation facilities settlement account* $R_h^{sa} = 0$ if not embedded *generation facility settlement account* $\sum_l R_h^l$ = sum of R_h^{sa} for all *settlement accounts*	h = a *settlement interval* ~~WEQ_h^{sa} = withdrawal *energy* quantity for *settlement account* sa for *settlement interval* h~~ $\sum_j \underline{WEQ_h^{\cancel{j}}}$ = sum <u>over</u> ~~of withdrawal *energy* quantity over~~ all *settlement accounts* <u>j</u> ~~for settlement interval h~~ R_h^{sa} = ~~min(WEQ_h^{sa},IEQ_h^{sa})~~ <u>minimum of WEQ_h^{sa} or $\sum_{m(a)} IEQ_h^{m(sa)}$</u> if <u>*settlement account* sa is assigned to a</u> group of embedded *generation facilities* ~~settlement account~~ <u>$\sum_{m(sa)}$ = sum over all *MNNs* m(sa) associated with *settlement account* sa, excluding *MNNs* at which the injection *energy* quantity for *settlement interval* h is negative</u> $R_h^{sa} = 0$ if <u>*settlement account* sa is not assigned to a group of</u> ~~not~~ embedded *generation facilities* ~~facility settlement account~~ $\sum_l \underline{R_h^{\cancel{l}}}$ = sum <u>over</u> ~~of~~ R_h^{sa} ~~for~~ all *settlement*	To correct an error in the definition of R_h^{sa}. To align with rule change for negative IEQs to be ignored.

Existing rules (Release: 1 April 2006)	**Proposed rules** (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	**Reasons for modification**
	accounts 1	
4.4.9 NEAD will be calculated for each *settlement interval* in the day during which a *market participant* has withdrawn *energy*. The *settlement statement* will show the total NEAD payable by that *market participant* for that *settlement*.	4.4.119 The NEAD determined for each *settlement interval* of a given *trading day* and payable by a given *market participant*, shall be aggregated and included in that *market participant's preliminary settlement statement* for that *trading day*. ~~NEAD will be calculated for each *settlement interval* in the day during which a *market participant* has withdrawn *energy*. The *settlement statement* will show the total NEAD payable by that *market participant* for that *settlement*.~~	To improve clarity. "Calculated" is replaced with "determined" for consistency with the rest of Chapter 7.

Annex 2: Ancillary rule modifications to Chapter 7

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
2.1.2 The *EMC* shall establish procedures whereby each *market participant* and *market support services licensee* shall provide to the *EMC* such information as may be required by the *EMC* to establish and maintain a *settlement account* for it, such that: 2.1.2.1 each *settlement account* is associated with a single *market participant* or *market support services licensee*, in the sense that that *market participant* or *market support services licensee* is financially responsible for the *settlement* payments made into or from that *settlement account*; and 2.1.2.2 each *market participant* and each *market support services licensee* is associated with a single *settlement account*, in the sense that the *settlement* payments made with respect to that *market participant* or *market support services licensee* are accounted for, invoiced and made through that *settlement account*	2.1.2 The *EMC* shall establish procedures whereby each *market participant* and *market support services licensee* shall provide to the *EMC* such information as may be required by the *EMC* to establish and maintain a *settlement account* for it, such that: 2.1.2.1 each *settlement account* is associated with a single *market participant* or *market support services licensee*, in the sense that that *market participant* or *market support services licensee* is financially responsible for the *settlement* payments made into or from that *settlement account*; and 2.1.2.2 each *market participant* and each *market support services licensee* is associated with a single *settlement account*, in the sense that the *settlement* payments made with respect to that *market participant* or *market support services licensee* are accounted for, invoiced and made through that *settlement account*.	The reference to section 4.4.1 in the existing section 2.1.2 should be a reference to the existing section 4.4.2. The reference to section 4.4.3 in the existing section 2.1.2 is changed to a reference to section 4.4.4 to reflect the section numbering changes in the proposed rule modifications.

Existing rules (Release: 1 April 2006)	Proposed rules (Deletions represented by strikethrough text and additions (and formatting changes) underlined)	Reasons for modification
except where a *market participant* has embedded *generation facilities* as defined in section 4.4.1, the *market participant* will be assigned a separate *settlement account* for each group of embedded *generation facilities* and the associated *load* as defined in section 4.4.3.	except where a *market participant* has embedded *generation facilities* as defined in section 4.4.2~~1~~, the *market participant* will be assigned a separate *settlement account* for each group of embedded *generation facilities* and the associated *load* as defined in section 4.4.4~~3~~.	