17 January 2014

Melinda L. Ocampo
President
Philippine Electricity Market Corporation
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ADB Avenue, Ortigas Center
Pasig City 1600
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Dear Ms Ocampo

Certification of the Market Settlements Software

PA Consulting Group (PA) has been asked by the Philippine Electricity Market Corporation
(PEMC) to act as an independent market auditor to perform certification testing of the market
settlements software to verify its compliance with the Wholesale Electricity Spot Market
(WESM) Rules. This certificate is similar to and builds on the previous certificates for the
market settlements software, dated 30 September 2011, and 7 November 2012.

Certification

This certification is specific to the Excel spreadsheet programs listed below that implement
the market settlements calculations based on clause 3.13 of the WESM Rules and on the
mathematical equations specified in the relevant Market Manuals and Internal Procedures.

As a result of our examination of the WESM Rules, the Market Manuals, PEMC's internal
procedure documentation and the market settlement spreadsheet programs, we are able to
provide the following certification with respect to the market settlements software:

> *We certify that, when used correctly, the market settlements spreadsheet programs
> listed below, as used by the PEMC in the 83rd Billing Period and provided to PA in
> July 2013, will perform substantially in compliance with the software specifications
> implied by the WESM Rules as amended by Department of Energy (DOE)
> Department Circulars up to and including DC2012-02-0001, together with the
> associated WESM Manuals with the exceptions noted below.*

This certification relates solely to the calculations that are performed within the market
settlements spreadsheet programs and makes no comment on the general suitability of the
programs in performing the required tasks. It covers only the automated processes within the
programs and assumes that all associated manual tasks are performed as required and
without error.

Scope of the review and certification

The scope of the review has included, at a minimum:

1. Examination of the algorithms used in the market settlements software to determine if the algorithms are mathematically equivalent to the prescriptions in the WESM Rules and associated Market Manuals;

2. Tests to determine whether the outputs of the market settlements software are consistent with those which result from the application of the prescriptions in the WESM Rules and associated Market Manuals; and

3. Identification of inconsistencies and non-compliance of the market settlements software with the WESM Rules and associated Market Manuals.

The independent audit does not include ensuring that the computational performance of the software is in accordance with any requirements of the WESM Rules.

List of software programs covered by this certification

This certification is limited to the following programs:

1. Settlement Engine

2. Line Rental Program

3. Administered Price Cap Program

4. Market Fees Program

5. VAT Program

6. PSM Program

7. NSS Program

8. GPI Program

9. MRU Program

10. Prudential Assessment

11. Prelim Program

12. BCQ Programs

13. Settlement and Meter Report

Nature of the tests conducted and results obtained

In performing the review and certification of the market settlements software, we have:

- Examined the WESM Rules and the Market Manuals to fully understand what functions the software is required to perform, what data it is required to use, what results the software is required to produce, and how it is to calculate them; and

- Conducted a series of tests on the software to determine whether the software properly performs these functions and correctly calculates the results required. In

this respect, the software was tested for its accuracy in representing the requirements of WESM Rules and Market Manuals.

Provided the market settlements software is used in the manner intended and according to the correct manual procedures, and with data that conforms to the requirements specified in the PEMC documents or, if not explicitly discussed therein, is within the expected range of values for data pertaining to the characteristics of the Philippine electricity system, we have found that the market settlements spreadsheet programs perform all functions and correctly calculate the required results with the following exceptions:

- **Administered Price Cap Program:** If a generator has a zero metered quantity in the corresponding period in each of the 4 previous weeks, the program computes the Administered Price for that generator as zero. While the correct price in this case is not defined by the formulation in the procedure manual, a price of zero is unlikely to be consistent with the intent of the markets rules and applicable ERC ruling.

- **Administered Price Cap Program:** Incorrect application of administered prices to single region: Sections 4.2.5.2 and 4.2.5.3 of the WESM Administered Prices manual (1.3 - WESM-AP-003_04282011) specify a re-allocation of trading amounts when administered prices are applied to one region only. The requirements of these sections are not implemented in this program or in any other program currently in use by BSMD. Therefore, BSMD are not in compliance with these requirements.

- **MRU Program:** Unhandled input data scenario results in material error: The macro produces zero EAETA and EPETA results for the condition $EAQ = MRU$ when both EAQ and MRU are non-zero. Strictly speaking, the procedure manual STL.05.00 does not specify what EAETA and EPETA should be in this case, as it only specifies formulae for $EAQ > MRU$ and $EAQ < MRU$. However, all these formulae produce the same EAETA and EPETA values for $EAQ = MRU$ and these values would be the logically correct result, rather than zero. Therefore, the program is producing a materially incorrect result according to a reasonable interpretation of the manual. There was a line of code in the macro that would have alerted the user to the fact that a set of input values was not covered by any of the formulae, but this line has been disabled (commented out) so that no error message is raised. A similar situation to the previous observation will also exist for the condition $MQ = MRU$ for the calculation of EPETA values.

Disclaimer of Liability

Despite the extensive testing of the software, this certification is not, and cannot be, in the form of an absolute guarantee.

Further, our certification is only valid if the software is used with care and for the purpose for which it was designed and tested.

In furnishing this certification, PA specifically limits its liability to the cost of repeating all and any certification evaluations, and any necessary re-certification in reliance on those evaluations. No person shall be entitled to claim against PA, any losses or damage whether direct, indirect, special or consequential, in excess of that limitation. PEMC shall ensure that all persons or parties who may rely on this certification are aware of this limitation of liability.

PA

Yours sincerely

Steve Thornton
Member of PA's Management Group