

VA Joint Working Group

Summary of Consultation Comments and Responses

April 17, 2008

1. Background

In the fall of 2005, the Volt-ampere (VA) Joint Working Group (JWG) was launched to further review and discuss the issues associated with the establishment of methodologies pertaining to the determination of VA demand and VA-hour energy. The mandate of the JWG was to identify and study the factors which contribute to the potential inequity, and to make recommendations which would minimize or eliminate the inequities found. The JWG worked under the general direction of the Electricity Policy Advisory Committee (EPAC).

The VA JWG gathered substantial data, developed analysis tools, and performed evaluations of all the identified factors which contribute to variation of VA demand and energy measurement. The results of that work formed the basis for the draft recommendations which were presented for public consultation in September 2007.

After completion of the consultation, the JWG reconvened to review comments received, make modifications where warranted, and established a final set of recommendations, including implementation plan and next steps.

2. General

Several formal comments were received from external parties including large and small electricity utilities, one manufacturer, one provincial electricity system operator and one association representing a group of industrial power consumers. Some comments were received long after the consultation period concluded, however the JWG did take into account those submissions.

2.1 The majority of comments received during the consultation related specifically to aspects of implementation such as time frames, and grandfathering issues. There was some general concern about current meters in service not being able to comply with the recommendations.

JWG response: The JWG recognizes this and has established an implementation plan which includes grandfathering clauses for certain recommendations. The JWG has modified some of the originally proposed implementation parameters.

2.2 The majority of technical comments received, related to the potential impact on current practices of measurement being performed outside a meter.

JWG response: The mandate of the JWG did not pertain specifically to measurement being performed either inside or outside of a meter, but rather to defining what exactly is a unit of VA in the legal metrology context.

2.3 Some comments received were in direct contradiction with others, and in some cases opposed standardization because it would necessitate changes to tariff and rate structures.

JWG response: It is recognized by the JWG that rate structures and supporting infrastructure have been established around a system of measurement that is inconsistent in its definition of the units of VA/VA-h

and in particular VA demand. In any other field of trade measurement, it is the measurement that is consistent and the rates which may vary depending on the location, type of customer, or who the seller is. From a purely technical/metrological perspective the JWG does not accept that the “standard of measurement” should be compromised in order to maintain established rate structures. However, the JWG does accept that a certain amount of time is required for the market to adjust to utilizing a definition of a legal unit of measurement which is standard and equitable across the nation.

2.4 There were virtually no objections to the technical or metrological principles of the JWG’s recommendations. In fact there was generally strong support for many of the recommendations including the elimination of thermal and exponential demand, standardizing on vectorial addition and direct calculation of VA through incremental measurement of watts and vars, and eliminating the inclusion of Q-h and distortion power as factors in VA determination.

3. Comments Pertaining to Demand Response

In general the original recommendations of the JWG were supported, especially the elimination of thermal and exponential demand responses.

3.1 Many comments expressed concern regarding the five sub-intervals of 3 minutes. The concerns related to current practices of measurement being performed outside a meter and the systems and structures which are in place to support these current practices. Some utilities fully supported the original recommendation of five sub-intervals of 3 minutes.

There was some concern that the recommendation would result in slightly higher measured values of demand for some customers.

JWG response: This could be true as the recommendation was based on analysis which indicated that 3 minute sub-intervals of a 15 minute sliding window demand interval was the most accurate representation of actual load. An accurate representation of load is exactly what is desired in terms of establishing a fair and equitable playing field.

3.2 There was concern related to the increased amount of metered data which a utility would have to collect and that systems in use were not designed to handle 3 minute sub-intervals.

JWG response: The JWG’s recommendations in general effectively eliminate any need for having to gather such data from a meter and calculate a LUM outside the meter. The recommendations in general would result in all meters being directly capable of measuring, calculating, and presenting any LUM required. Those values need only be transported or communicated in some manner to utility billing systems with no further manipulation required. In light of current practices, the JWG decided to modify the recommendation to three sub-intervals of 5 minutes as it was thought that this modification would facilitate the LUM JWG in adopting our recommendation in regards of measurement performed outside of a meter.

3.3 Other comments regarding this recommendation simply suggested that Measurement Canada allow individual utilities use whatever various methods of demand response they desire simply because that is what is being done now.

JWG response: The JWG can only respond to this rationale by reiterating the objective of the JWG, which was to make recommendations to address the current situation of possible inequity resulting from the application of non-standard measurement methodologies. This objective cannot be achieved without some change to current practices.

3.4 Concern regarding the 15 minute demand interval was expressed from one market segment where either 30 minute or 60 minute block demand intervals are currently being used. Again the concerns were not about the technical or metrological aspects of the recommendation but about impact on current market structures, and specifically about current practices of measurement being performed outside of a meter. The arguments raised contradicted the JWG mandate to standardize.

JWG response: The JWG concluded that it would be willing to accept the idea of the recommendation being dependant on customer class (high intervention vs. low intervention), and modified the recommendation to reflect that. The JWG was not in a position to establish parameters which would differentiate between the customer classes and decided to defer that decision to EPAC.

4. Comments Pertaining to VA Determination

4.1 The recommendation requiring that VA be determined from source data on a continuous interval basis was generally supported. One comment was opposed to this recommendation mainly because this relates to the recommendation pertaining to measurement of vars by quadrant. One comment referred to existing limited capabilities for increased data gathering in regards of measurement performed outside a meter.

JWG response: The JWG's recommendations in general effectively eliminate any need for having to gather such data from a meter and calculate a LUM outside the meter. The recommendations in general would result in all meters being directly capable of measuring, calculating, and presenting any LUM required. Those values need only be transported or communicated in some manner to utility billing systems with no further manipulation required. The recommendation does not restrict calculation of LUM to be performed only within an approved meter. The LUM JWG is mandated with developing criteria which will allow for LUM to be calculated outside of an approved meter.

4.2 The recommendation for elimination of Q-h values as a factor in VA determination was generally supported. One comment suggested that the use of Q-h metering not be eliminated.

JWG response: The JWG proposals do not eliminate the use of Q-h metering per se if desired to be used by a utility for information purposes. However the definition of VA as supported by the other recommendations precludes the use of Q-h values as a factor in determining a measure of VA or VA-h since it is limited in its range of accurate measurement. The unit Q-h is not a LUM pursuant to the *Electricity and Gas Inspection Act*.

4.3 The recommendation requiring that VA/VA-h of a polyphase load be calculated by vectorial addition was generally supported. The only comments received pertained to the proposed implementation and the number of existing meters that would be impacted.

JWG response: The JWG modified the implementation proposal such that meters would be eligible to remain in service until the end of their reverification period, including reverification periods established through seal extension.

4.4 The recommendation for direct measurement of vars/var-h was generally supported.

4.5 The recommendation to eliminate distortion power as a factor in VA determination was almost fully supported.

One comment suggested that harmonic and distortion power do represent a cost to utilities and therefore there should be some mechanism to recover those costs.

JWG response: The JWG agrees in principle however does not agree with including distortion power as a factor in VA determination because that method does not distinguish between power users that create distortion (sources) and those that absorb distortion (sinks), it leads to arbitrary and inconsistent values and is therefore inequitable. The JWG agrees that utilities should have some standard mechanism, which does not impact on VA, for measuring harmonic and/or distortion content directly and penalizing the source customers (and possibly crediting the sink customers).

4.6 One comment suggested that only the fundamental frequency waveform (no harmonic content) should be utilized. Several theoretical and scientific arguments were provided in support.

JWG response: The JWG agrees in principle, however also recognized that low-cost meters which can perform that type of measurement are not widely available today. The JWG did perform studies which indicated that response to fundamental waveform plus harmonic content was a close approximation to that of fundamental waveform only, however the inclusion of distortion content created significant differences and inequities. The mandate of the JWG was to recommend a method of VA determination which is consistent, fair and equitable for trade measurement in Canada, and not to conclude on an absolute scientific or theoretical definition of VA.

4.7 The recommendation that VA/VA-hrs shall be determined based on continuous accumulation of instantaneous or incremental values was generally accepted with the exception of a small segment of the electricity marketplace, that being of certain large power customers or wholesale customers. Two utilities commented that they currently determine VA in a manner that takes into account the quadrants in which vars occur and would want to continue to do so. Both those utilities treat the vars by quadrant in a different manner resulting in significantly different values of VA for the same load. Concern was expressed that utilities would not have the ability to charge their customers based on the quadrant in which reactive power or energy occurs.

JWG response: The current system whereby reactive power and energy are incorporated as a factor in VA determination without standard methodology results in drastically different values of VA and an inequitable system of measurement. This is because unlike VA, vars do have direction and if the direction is not taken into account, or is manipulated in many different ways, the resulting VA has no standard meaning. The JWG has proposed a recommendation that will minimize or eliminate all the large discrepancies and inequities and will level the playing field in regards of measurement of the LUM called VA/VA-h. The recommendation does not preclude electricity distributors from using var/var-h measured values in establishing the basis for a charge or credit for that particular LUM. In fact the JWG recommends that reactive power and/or energy be directly measured with an identification of the direction or quadrant in which the reactive energy occurs. Utilities that wish to charge or credit customers for lagging or leading reactive power or energy can establish rates specifically for those measured values. Therefore utilities will still have the ability to perform whatever measurement they desire in regards of reactive power or energy, but it will have to be done in manner which is not incorporated in the determination of VA. In layman terms, when one is selling a given "product X" for a certain price per unit, one must measure the number of units of that product specifically, (not the measurement of product X plus additional different products, nor of a completely different product). This recommendation will eliminate the current practice which is analogous to measuring the amount of "Product X+Y" in some cases, "Product X+Z" in other cases, and "Product Z" in other cases even though the product being sold is "Product X".

4.8 One comment expressed concern that totalized measurement and single point measurement would be treated differently.

JWG response: The JWG is aware that it is not possible to measure VA directly in situations of totalization. The JWG maintains that the principles of this recommendation be applied to totalized metering as the purpose of totalization is to measure the LUM of two or more separate meters, and

combine those quantities in a manner that is representative of the LUM that would be measured if the loads were measured by a single meter. As totalization is a process that occurs outside a meter, the LUM JWG must consider the principles of this recommendation when establishing technical criteria pertaining to totalization.

5. Conclusion

Measurement Canada and the VA JWG wish to thank all stakeholders who took the time to participate and who provided comments in regards of the proposed recommendations pertaining to VA/VA-h determination.

The JWG believes that it has achieved the best possible recommendations in regards of its mandate to develop a standard method of VA measurement (energy and demand) that is fair, accurate, consistent and equitable for the Canadian electricity trade marketplace.

A final report titled “*Recommendations of the VA Joint Working Group*” has been submitted to the EPAC and Measurement Canada for review. Once accepted, MC will begin to work on implementation of the recommended actions through issuance of specifications and amendments to the *Electricity and Gas Inspection Regulations*.

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