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ELECTRICITY-WATER-WASTEWATER-FIBER OPTICS

May 31, 2007

Mr. Carl Seigenthaler
Tennessee Valley Authority
One Century Place
26 Century Boulevard
Nashville, TN 37214

Re: Bowling Green Municipal Utilities' Comments
In the Tennessee Valley Authority's Process To Consider
"REQUIREMENTS OF THE FEDERAL ENERGY POLICY ACT OF 2005 AMENDMENTS TO PURPA TO CONSIDER IMPLEMENTATION OF STANDARDS FOR SMART METERING, NET METERING, INTERCONNECTION, FUEL SOURCES, AND FOSSIL FUEL GENERATION EFFICIENCY"

Dear Mr. Seigenthaler:

Bowling Green Municipal Utilities (BGMU) wishes to provide comments for consideration by the Tennessee Valley Authority (TVA) in its process of considering whether to implement, as required by the Energy Policy Act of 2005 (EPAct), any of five energy efficiency and conservation standards; smart metering, net metering, interconnection, fuel sources, and fossil fuel generation efficiency.

BGMU is a TVA municipal Distributor serving 26,800 customers in Bowling Green Kentucky. BGMU has a summer peaking demand of 202 MW and delivers over 900,000 MWh's of energy. Approximately 83% of BGMU's customers are residential class. BGMU's annual (8760 Hr) system load factor is approximately 53% with an average annual monthly load factor of approximately 70%.

BGMU participated in developing the Tennessee Valley Public Power Association (TVPPA) PURPA response and recommendations and fully supports those recommendations. The purpose of BGMU's comments is to express that support and to specifically emphasize some points important to BGMU. The TVPPA recommendations will be referred to without restatement.

It is BGMU's hope that the intentions of the EPAct - requiring consideration of these five standards - will result in encouraging responsible utilization of energy to manage and conserve natural resources and the environment; assure adequate, reliable, and economical electrical energy availability; and encourage economic development and

growth of business and community. BGMU recognizes and supports TVA's efforts to provide rates structures for services and options customers need to make electricity a resource in businesses and homes with appropriate pricing signals to consumers and with appropriate cost recovery.

BGMU recognizes TVA's regulatory role for the Distributors. We also recognize the process required in the TVA - Distributor Wholesale Power Contracts for implementing specific rates and rate changes. The EPAct requirement is to consider "standards" which, in some cases, might require specific rates be developed and made available to customers by specific dates. Recognizing the difficulty of designing any standard that TVA may decide to adopt, given the EPAct timeline and the Wholesale Power Contract process, BGMU believes the power contract process must be followed and that rate implementation or change cannot be brought about through adoption of the EPAct standards.

This is especially important because of the wholesale supply - retail delivery and end use billing (and rate) structure currently in the power contracts. Changes suggested by some of the standards, specifically smart metering (involving time of use concepts) and both net metering and interconnection (involving non TVA generation), would apply to the retail side of the process and could drive changes in the end use billing process and the wholesale rate side of the process. BGMU believes that EPAct standards, if adopted, would be most effectively applied at the consumer level and that any retail rates and any resulting change in wholesale rates or the end use billing structure that might be necessary to implement those standards should be made through the power contract process.

A strict adoption of some of the five standards with their associated deadlines for implementation could force a compromise of the power contract process and might not allow sufficient time to implement the necessary supporting infrastructure or to begin informal education and marketing programs to make them successful.

Consideration of the above three EPAct standards may lead to operational and business changes that would have direct effect on any individual distributor's systems. Grid connection of non TVA generation on a Distributor's system must be managed by both TVA and each Distributor to ensure a safe, reliable delivery of power with appropriate cost recovery rates and contracts. Each Distributor has different operational and business costs and system needs. BGMU strongly encourages TVA to fully include individual Distributors in any operating, business, or contractual processes involving a Distributor's customer and to include mutually acceptable operations or business standards and service requirements an individual Distributor may need in serving that customer.

BGMU also recognizes that each individual Distributor's system is unique in capability, construction, and cost structure. The response of each Distributor's customers to pricing signals may significantly differ. The appropriateness and effectiveness of specific services, such as time based rates or customer oriented energy management systems, and operational tools, such as automatic meter reading or remote service energization, may be entirely different from one system to another. Therefore, BGMU strongly supports the TVPPA recommendations that any of the three above standards that may be adopted

should be on the basis of local option for each Distributor based on each Distributor's particular circumstances.

The EPAct Smart Metering, Net Metering, Interconnection standards would make changes in areas where cross subsidization of costs would be possible among rate classes and among customers. Some cost shifting could be indirect, such as the increase in depreciation expense from early retirement of existing systems or such as distribution system upgrades driven by customer owned generation. In any standards adopted, all costs of the systems and changes involved should be allocated to the appropriate customers and rate classes.

TVPPA has provided a full discussion of each proposed EPAct standard in its response. BGMU would like to add a few comments from this utility's perspective, specific to each standard, and without repeating TVPPA's full discussion of the issues.

SMART METERING (Time based metering and communications enabling customer management of energy use and cost through advanced metering and communications)

It has been said that "Nothing changes until something changes." There is no question of the critical need for efficient use and conservation of energy, whether for environmental, economical, or resource availability reasons. The proposed EPAct standard describes a specific goal with a near term implementation deadline. Adoption of that standard and its time based rates for all customers would cause something to change, but might not cause the most effective change to encourage efficiency and conservation, and could cause infrastructure to be installed without sufficient supporting benefits to make it successful. It is, though, important to cause to happen a focused change that leverages benefits of multiple applications against the costs of new infrastructure required for these standards, and that changes the energy awareness culture through incentive, education, and technology.

When a time based rate is offered, a complex and expensive supporting infrastructure of metering, communications, data management, and billing systems must be in place. Systems include equipment, software, processes, and people. Implementing a blanket, and possibly mandatory, rate that would cause design and implementation of these systems without time to incorporate leveraging uses and without time to create the cultural energy awareness and supporting energy management systems carries a great deal of risk that the desired long term change may not be brought about. Those risks are much greater at the residential and smaller commercial level because of the size and front end cost of the systems. At any customer level, there is risk that those systems and rates may not cause desired energy efficiency by shifting demand and decreasing energy, but might cause only a redistribution of the energy costs among customer classes. There is also an element of risk in that consumer demand responsiveness may not match the responsiveness assumptions upon which the rate and infrastructure changes are based. Pilots to test the responsiveness of specific areas and customer classes, marketing efforts to direct that responsiveness ahead of time, and an implementation plan that minimizes risk to ratepayers of needing to pay for an unresponsive system are strongly

recommended. TVA's current demand response pilot is an excellent example of this approach.

BGMU supports the TVPPA recommendation of not adopting the EPAct standard, but encouraging individual Distributor study and appropriate implementation of such systems as may be effective and suited for that Distributor's system and customers. Additionally, these specific Smart Metering Standard comments and observations are also offered.

- "Time based rates and smart meters" does not equate merely to time of use rates and remote meter reading. Customers of any segment need the ability to understand the rate they are paying, see the energy they are using and its rate at any given time, and to have the process and equipment to facilitate response before they are likely to modify energy usage. Giving incentive and the knowledge and ability to respond rather than a mandate without options will have greater success.
- It is probable that changes affecting mostly "on-peak" usage will cause a shift in usage rather than a decrease, or at best a decrease only on-peak, resulting in minor decreases in generating fuel use and more significant postponements of capital for plant expansion. Building fewer plants or postponing them without decreasing on-going usage doesn't necessarily support fuel efficiency and conservation. Load factor improvement is important, but so is overall energy efficiency and that may take more than a time based rate by itself. For on-peak demand response, full scale load control programs such as being studied by the pilot demand response program, interruptible products, and distributed generation may have impact comparable to or exceeding time based rates. For efficiency and resulting decrease of generating fuel use it may be more effective to emphasize efficient equipment technology and standards, energy awareness education and marketing, and provision of real time fuel gage systems so customers can manage energy effectively along with affordable simple load management systems.
- Strengthening the TVA - Distributor partnership with focus on influencing customer segment energy awareness and responsible energy use, promoting efficient and controllable energy using equipment and energy management systems, providing a real time - response enabling - "fuel gage" to the customer, and providing technical and marketing support to encourage customer initiatives is important to long term, lasting change.
- In any changes adopting time based rates for general customer classes, it seems the greater chance of success lies in mandatory rates rather than voluntary on a single customer basis, because the customer's incentive on the voluntary rate would most likely be that their load curve advantageously fits the time based rate schedule, which would not result in significant load modification, but would cause cross subsidization among customers of the same class.
- On the BGMU System, residential and small power (less than 50 KW) customers use about 40% of the energy and larger customers (above 50 KW) use most of the remaining 60%. Residential, small commercial, and large commercial would each have differing abilities to respond to time based rate structures and would differ in whether demand or cost would be shifted. This also affects economic health and customer satisfaction levels.

- The total demand of the 50 highest demand hours during the year represents about 1% of BGMU's total annual energy sales. The highest 100 account for about 2%, and the highest 200 hours account for about 4% of the total year. 30% to 35% of the total annual energy usage occurs during a six hour "on-peak" period of each day of the year. This shows the potential impact of decreasing energy during the system peak periods and during year around TOU on peak periods. If a TOU rate decreased (not shifted) energy usage 2% for the 6 hours of on-peak period each day of the year, it would save 0.68% of the annual energy, or about 5 of the 900 GWh's used. For the top 200 hours, that would be about 0.01%.
- The average residential BGMU customer uses about 12,000 KWh's annually and pays about $940 for it. With an 80% spread in off to on peak rates during off season and a 100% spread during on season, and no load shift or decrease at all, the $940 annual cost would go up to $1,065. With a similar 170% and 570% spread, the annual cost would go up to $2,220. If the customer then shifted 10% of the energy from on to off peak, the $2,220 would decrease to $2,025. It would seem to take very large magnitudes of on to off peak rate separations to cause significant residential response to time based rates.
- Considering BGMU's entire system annual energy sales, a time based rate for all energy that would cause a shift of 10% of all energy from on peak to off peak periods with no overall decrease in usage, and which would have a 4.5% off peak and a 14% on peak pricing spread would lower BGMU's annual power costs (and revenues) by about 2.3%. The same spreads without an on to off peak shift would be essentially cost (and revenue) neutral. To the extent that wholesale rates are not closely aligned with retail rate structures and with actual usage shifts, the risk of revenue short-falls or long-falls can be significant, especially given that, to assure demand responsiveness, greater rate spreads that those assumed here would most likely be needed.

NET METERING (Metering whereby energy generated by an electric consumer is used to offset energy supplied by the utility during a specified period)

The TVA Green Power Switch Generation, and Demand Generation, Partners Programs are examples of TVA's commitment to renewable energy development and of TVA's on-going work to expand its diversification of fuel sources and technology. They have for several years provided a mechanism for customers to support renewable energy and demand management which meets the conceptual, if not the technical, definition of net metering.

BGMU supports the TVPPA recommendation to adopt a standard modeled after these programs in response to the EPAct proposed net metering standard. This would encourage customers in an important cultural transition to develop and utilize renewable energy sources.

BGMU also recommends consideration be given to easing the program's limitation of wind generation systems for demand metered customers, as well as to allowing other appropriate renewable energy generation types that might fall into a viable renewable

energy category. It is also recommended that the standard have an agreement term of not ten years from the effective date, as the current program calls for, but on-going, with the amount of payment for generation reverting to the customers cost of purchased energy after ten years. A customer committing to a generation investment needs to know it can continue to be used throughout it's useful life. It is also recommended the deadline date for entering into this agreement (The current program is a pilot.) be removed or changed to a clause allowing modification or discontinuation of the standard with appropriate notice.

Each individual Distributor may have different and system specific technical, operational, and business needs in an agreement with the customer. A draft, unapproved grid interconnection and net metering standard is attached as an example of BGMU's specific system needs.

Two customers on the BGMU have attempted to install Generation Partners renewable systems, one solar and one wind, both being demand metered customers and both supporting renewable energy systems through state educational and multi-state business institutions. The solar system was not able to meet the technical requirements of grid interconnection and the wind system is currently designing and installing its systems.

Distribution system safety and reliability responsibility falls to the Distributors. To that end, the individual distributors need voice in net metering and interconnection standards. Reference to the single IEEE 1547 standard quoted in the EPAct Interconnection standard is too general. To ensure safety of personnel and public and reliability of service, Distributors need to ability to specify appropriate industry and local standards.

INTERCONNECTION (Service provided to a consumer under which a consumer's on site generation would be connected directly to the utility's distribution facilities)

The distinction between net metering and interconnection seems to be that interconnection is assumed to be generation connected "directly" to the grid to supply energy to the grid, rather than, as with net metering, generation connected to the grid through a customer's system primarily to offset the customer's load through the customer's billing meter. Technically, the two types of systems are very similar. Practically, the type of generation used and the size of the systems may tend to differ. Both are behind a revenue meter and have similar protection, quality, and isolation requirements, but interconnection service typically has a greater amount of energy returned to the utility system and may use non-qualifying renewable energy sources.

There are some potential situations that fall more in the interconnection area either because they may not fit the Generation Partners renewable energy qualifications or because the generation may significantly exceed load, but still may offer EPAct related advantages. Backup generation provided by customers for increased reliability on their systems seems to fall into this area. Typically, the generation type is generation fueled by diesel or bio-diesel, not necessarily renewable, but is capable of off-setting TVA and Distributor peak demand for a limited amount of time. To avoid purchased power or other very high cost generation alternatives, coordinated application of these back-up generators during peak would look like an interruptible load without actually dropping the load. The equipment necessary to make the grid interconnection would also serve a customer's need for closed transition switching during self-initiated load switching.

BGMU currently has one customer designing and building up to 4 MW of backup diesel generation with equipment that would allow grid interconnection. There is no rate or agreement specifically designed to allow this as a grid connected operation at the present time. Offsetting peak demand is one purpose of EPAct. When compared to the amount of demand responsiveness that would be needed by a large customer to a time of use rate, utilizing this backup generation could be very effective.

BGMU supports the TVPPA recommendation that Distributors not be mandated to provide interconnection services, but that TVA allow a local option in those cases where, in the Distributor's judgment, such interconnections meet acceptable technical, operational, and financial qualifications. BGMU additionally and particularly would encourage consideration be given to backup generation as a demand management tool, and expresses a strong interest in local participation in both net metering and interconnection service standards for situations where there is a mutual benefit to customer and utilities.

FUEL SOURCES (A plan to minimize dependence on a single generation fuel source or technology)

BGMU applauds and supports TVA's historical efforts to optimize generation fuel sources and to avoid dependence on any single source. The efforts have been most successful. TVA has demonstrated commitment to and encouraged use of renewable resources as a generation portfolio source through such programs and projects as Generation Partners solar and wind energy, Raccoon Mountain pumped storage, and Buffalo Mountain wind farm. BGMU supports the TVPPA recommendation that it is not necessary to develop a plan to minimize single source fuel dependence and include renewable energy in the generation portfolio, but to continue the planning and implementation that is already a way of doing business.

FOSSIL FUEL GENERATION EFFICIENCY
(Develop and implement ten year fossil fuel efficiency increase plan)

BGMU supports TVA's historical planning, technological innovation, and demonstrated commitment to optimizing generation efficiency and expense through plant operation and design and balanced fossil fuel sources. Although the Distributors do not now have generation responsibility, all Distributors share in the benefits of having the highest possible fuel efficiency consistent with high value pricing. TVA is already responsibly meeting or exceeding the intent of the EPAct standard requirement, and therefore adoption of a standard does not seem necessary.

Thank you for your consideration of our comments and input.

Sincerely,

Mark Iverson
General Manager
Bowling Green Municipal Utilities

DRAFT - UNAPPROVED
BGMU GRID INTERCONNECTION and NET-METERING STANDARD
Rev. 3 05/22/07

TECHNICAL:

1. Interconnection and safety equipment must be UL 1741 (Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems - Latest Update) rated for grid connected power systems. Compliance of the system and equipment with the latest update of IEEE 929-2000 (Recommended Practice for Utility Interface of Photovoltaic Systems) is also required. (The required UL 1741 testing is based upon IEEE 929 standards.)

2. System must be certified by licensed electrician, meeting all applicable code inspections, including NEC (National Electrical Code - Latest Update). For a system capable of providing over 10 KW, the installation and protection designs must be provided by and stamped by a Registered Professional Engineer registered in the State of Kentucky.

3. Deterioration of service quality (voltage, flicker, frequency, waveform, power factor) for other customers or users on the BGMU system will not be allowed.

   A) The maximum allowable voltage flicker (rapid change in voltage) caused at the service entrance is as shown below:

   FREQUENCY OF VOLTAGE FLICKER PERCENT OF VOLTAGE:

   1 per hour to 6 per hour; 2.5%

   7 per hour to 30 per hour; 1.5%

   31 per hour to 6 per minute; 1.0%

   7 per minute to 1 per second; 0.7%

   2 per second to 15 per second; 0.5%

   (The above data is derived from charts and data in the Distribution Data Book by General Electric and from the Westinghouse Transmission and Distribution Book.)

   B) The total harmonic distortion of the voltage and/or current shall not exceed:

   5% of the fundamental 60 Hz frequency for the square root of the sum of the squares of the harmonics, and 2% of the fundamental 60 Hz frequency for any individual harmonic as measured at the customer service connection point.

   The latest version of IEEE 519 (Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems) will be followed for waveform distortion and harmonics.

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4. System must be non-islanding and must respond to BGMU system conditions according to IEEE 929, automatically disconnecting for abnormal BGMU voltage or frequency.

   LIMITS AND MAX DISCONNECTION TIMES (per IEEE 929):

   6 cycles max for <50% voltage

   120 cycles max for between 50% and 88% voltage

   120 cycles max for between 110% and 137% voltage

   2 cycles max for >137% voltage

   6 cycles max for <59.3 or >60.5 Hz

   The trip energy source for the interconnection breaker must be of a stored energy type that will be available under circumstances when the alternating current source is unavailable.

5. A fully rated breaker, visibly marked "Customer Generation Breaker," is required to isolate the generation from the BGMU system in the event of a BGMU system disturbance.

6. A facility Generation Breaker lockout or interlock is required to prevent the facility's generation from closing into or energizing a de-energized BGMU power system or de-energized BGMU equipment.

7. Reconnection of the generation after tripping of the Generation Breaker Lockout in response to an abnormal condition shall not be made except as allowed by IEEE 929 and following a five-minute period of normal voltage and frequency on the BGMU system as defined in the non-islanding specification. Breaker blocking to prevent manual reconnection after trip is required.

8. A manual, lockable, visible-open, load break disconnect is required between the generation source and the BGMU system that is visibly marked "Customer Generation Disconnect". This disconnect will be accessible to and lockable by BGMU, and may be operated without notice. (This disconnect will isolate ALL self generation from the main service entrance with a visible open.)

9. A permanent, weatherproof one-line electrical diagram of the facility located must be provided at the point of service connection to BGMU. A permanent weatherproof map of the facility showing the location of all major equipment including the BGMU meter point, the facility Generation Disconnect, and the facility Generation Breaker must also be provided. Included with or attached to this map will be the names and current telephone numbers of at least two persons authorized to provide access to the facility who have authority to make decisions regarding the facility interconnection and operation. This telephone listing shall be updated as needed to maintain its usefulness.

10. The generation meter, if installed, must have remote read capability or be located with the same accessibility to BGMU as the billing meter.

UNAPPROVED AND DRAFT

GENERAL:

1. Net-metered and interconnection service, i.e., interconnection with the BGMU grid creating parallel (net-metered) service supply, may be provided under this policy, subject to approval of the Tennessee Valley Association (TVA) and in the absence of any specific TVA program or tariff. Total generating facility rated capacity shall not exceed fifteen (15) kilowatts in any combination of single or three phase. Generating capacity above 15 kilowatts (KW) is not permitted under this policy, but may be considered on a case by case basis with review and approval of both TVA and BGMU.

2. The total available net-metered generation capacity, measured in rated KW, on the BGMU system at any time will be limited to the larger of 0.1% of the single hour peak load of the previous year or the total existing installed generation.

3. Net-metered billing with customer-owned generation will be used primarily to supply all or part of that customer's load and will be limited to a single BGMU service and account. Inter-connection of the customer's generating facility or of that customer's electrical service with any other electrical system served by another BGMU service is not permitted at any time on permanent or temporary basis. Net-metered billing will not include any other service, either in the name of net-metered customer or of another.

4. A net-metered account will be metered and billed using "net-metering" methods, which will mean the energy measurement will be the difference between the electricity supplied by the BGMU electric grid and the electricity generated by net-metered customer that is fed back to the electric grid during a single billing period. An excess of energy fed back into the BGMU grid during a billing period will be treated as a credit.

5. The customer's tariff and rate with net-metering shall be the same as the applicable tariff and rate would be if the customer were not net-metered and had no generation. The terms and conditions of a supplemental contract with the customer shall modify and/or be in addition to those of the customer's established rate and tariff.

6. In any case where demand or power factor may be measured and used in billing, vars and or watts into the BGMU grid will be treated and billed as if they were vars and/or watts supplied by the BGMU grid. In any situation where the tariff and rate call for demand measurement or billing, any demand established by an excess of generation over load shall be treated as billable customer demand. Vars, either from the BGMU system or into it, will be appropriately billed.

7. BGMU builds its electrical system facilities with the capacity needed to reliably serve its load. The costs of building the system are recovered through BGMU rates. Additional demand or facility charges may be required in order to reimburse BGMU for distribution facilities a net-metered customer may require over and above that needed to serve the customer's load, such as facilities needed to serve the customer when the customer's generation is not operating. The costs of those facilities would not otherwise be recovered by BGMU because billed energy usage and demand are normally reduced by customer generation.

8. A standard kilowatt-hour meter capable of registering the flow of electricity in two directions will be installed by BGMU when possible for net-metering. BGMU will read and provide on the customer's bill, the total energy usage or credit. The total of any

UNAPPROVED AND DRAFT

accumulated energy credits will also be provided on the customer's bill. Any additional equipment, meters, or upgrades needed to monitor the flow in each direction or that are requested by the customer shall be installed at the customer's expense. If additional meters are installed, the net-metering calculation shall yield the same result as when a single meter is used.

9. Under net-metering, if the electricity supplied by BGMU exceeds the electricity generated and fed back to the BGMU grid during the billing period, the customer will be billed under the terms of the customer's rate and tariff for the net electricity supplied. If the electricity fed back to the BGMU grid by the customer exceeds the electricity supplied by BGMU during a billing period, the customer will be credited for the excess kilowatt hours. Credits will be accumulated and carried forward for a period of 12 months. Any credits not used in the following 12 month period will expire. The customer's bill will show any credit from that month and any accumulated credits. In the event of a change in the rate per kilowatt hour charged, any the number of credits at the old rate will be adjusted to reflect the new rate.

10. No cash refund for residual net-metered generation-related credits will be paid at the time the customer closes the account or at any other time. Excess electricity credits are not transferable between customers or locations and will be removed when the account is closed.

11. BGMU shall be provided copies of facility plans and equipment specifications, electrical drawings, and estimates of generating facility output and service loads in advance for review and approval. The customer's electric generating system and interconnecting equipment shall comply with BGMU's Net-Metering Interconnection Standards and shall be made accessible to inspection by BGMU. The customer must obtain BGMU cocurrence before making changes or additions to the generation facility.

12. Grid connection privileges allowed by an agreement or contract may be terminated by the customer at any time or by BGMU with 30 days written notice. BGMU may also disconnect the service or generation facilities and terminate this contract and all grid connection privileges immediately, on a temporary or permanent basis, without notice if BGMU deems it necessary to ensure personnel or public safety, quality of service, or if terms of this contract or of BGMU's Net-Metering Interconnection Standards are not met.

13. BGMU may, from time to time, disconnect the generation facilities or service in order to perform work on the BGMU distribution system. Efforts will be made to coordinate with the customer and give notice when possible.

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