

**UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION**

**Standardizing Generator Interconnection  
Agreements and Procedures**

**Docket No. RM02-1-000**

**COMMENTS ON THE INTERCONNECTION NOPR**

**Submitted by BERGEY WINDPOWER CO.**

June 17, 2002

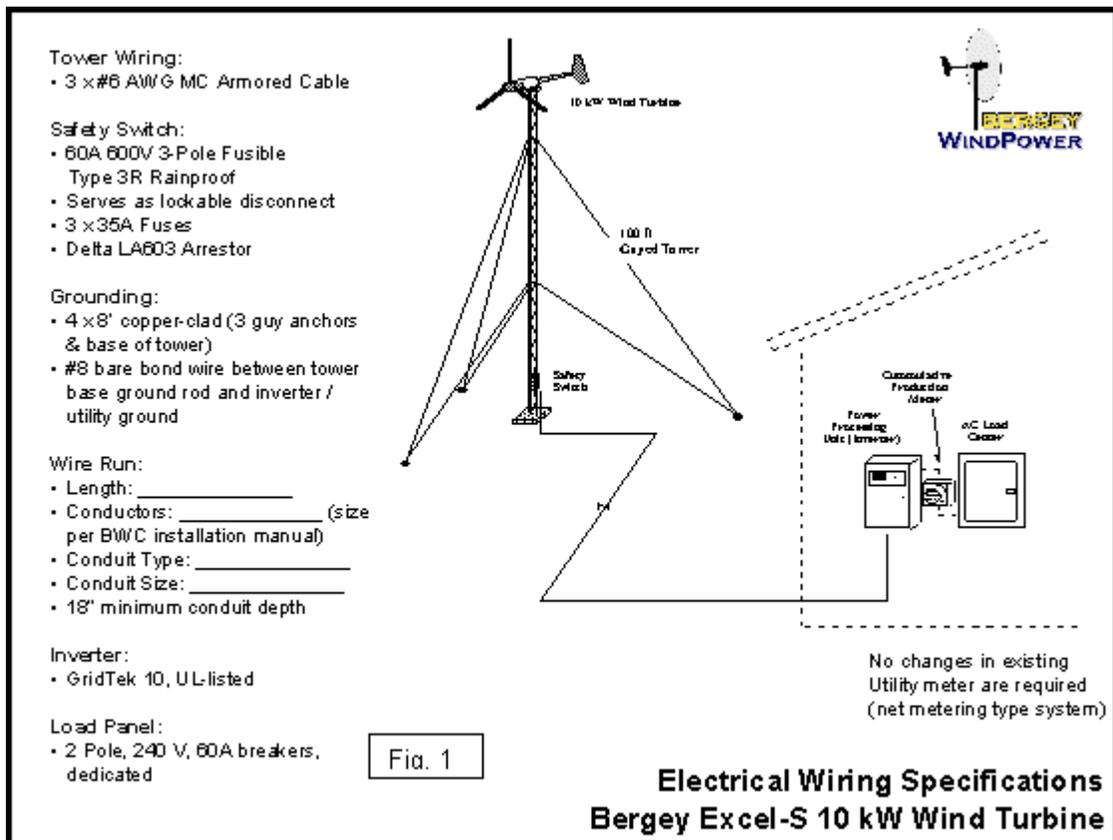
**Background**

Bergey Windpower Co. (Norman, Oklahoma) manufactures and sells small wind energy systems from 1 kW to 10 kW for both on-grid and off-grid applications. We have been in business for 25 years, have ~ 2,500 installed systems covering all 50 States, and we are the world's leading supplier of residential wind energy systems. Homeowners, farmers, and small businesses install our small wind systems to reduce their utility bills. Our first grid-intertied system was installed in 1980. I serve as chair of the Small Wind Turbine Committee of the American Wind Energy Association (AWEA) and have twice served as president of AWEA.

Bergey Windpower now has grid-intertie systems on over 150 investor-owned utilities, rural electric cooperatives, and municipal electric systems. We estimate that our wind systems have accumulated over 400 million hours of interconnected operation. Quite often our customers have had the very first customer-sided generator installed on a utility. As a result we have many, many times had to guide inexperienced utilities and inexperienced customers through the process of establishing a mutually acceptable interconnection agreement, with the associated technical and contractual requirements.

Sometimes this has gone smoothly and efficiently and other times the utility approval process has dragged on for months and consumed more labor hours than were required to manufacture and install the wind system.

Our wind systems operate at variable speed so we use power electronics (inverters) to connect to the grid. As shown in Figure 1, our system installations include a wind turbine, an accessible disconnect switch, an inverter, and a dedicated breaker in the customers circuit breaker panel (load center). The inverters include all of the wind system and utility protection functions, so additional protection equipment is not required.



### **Introduction**

Bergey Windpower supports the February 1, 2002 Small Generator & Public Interest Groups' comments on the ANOPR and the Joint Commenters / Multiple Public Interest Organizations filing today in response to the current NOPR. We also support the NOPR comments and recommendations filed today by the Solar Energy Industries Association, the U.S. Fuel Cell Council, and the American Solar Energy Society and we recommend Commission adoption, following a technical conference to resolve certain issues, of the IPs and IAs proposed in their submission. We share the Joint Commenters concerns that the proposed interconnection rule fails to provide appropriate standard interconnection procedures and agreements for smaller, customer-owned generating units, and we urge Commission adoption of the small generation IPs and IAs in the Final Rule issued in this proceeding.

In addition, we are taking this opportunity to make a few points on interconnection issues stemming from our experience on the "front line" over the last two decades.

### **Additional Comments**

**1. Small wind systems, along with other distributed generation technologies, have significant potential to contribute to our national electricity supply portfolio and FERC efforts to streamline their use will lead to greater competition in the marketplace.**

Our industry and the US-DOE have just completed a roadmap for small wind turbine technology through 2020. In that study the potential was estimated at 140,000 MW, including over 15 million homes. The industry has set a goal of 50,000 MW by 2020, which would contribute approximately 3% of total electricity sales or approximately 6% of total residential electricity. We see advanced, stealthy small wind systems as a “new age appliance” which has explosive sales growth potential given the right market conditions.

Making interconnection of small customer-owned generation systems a quick, painless, and inexpensive process serves to promote competition in marketplaces where there is a shortage of competition. Consumers need more choices for electricity supply and utilities need to feel more of the hot breath of competition on the necks. The Texas deliberative polling experience shows that there is a substantial pent-up demand for clean energy alternatives and that a significant majority of ratepayers are willing to pay more for it. Our experience, nation-wide, is that homeowners, farmers, and small businesses are intrigued by the prospects of being able to “spin their meter backward” and they dream of the day they can take control of their own electricity supply destiny.

The electricity supply marketplace discriminates against higher-cost, but more price-stable renewable resources because utility management and shareholders are insulated from fuel cost risks by the ubiquitous “fuel adjustment charge”. Consumers, on the other hand, can and do get hammered by price spikes. Distributed generation systems using wind and solar energy provide an alternative. Brent Alderfer, a past Commissioner of the Colorado PUC, has also made the point that for load centers that are effectively

islanded by weak transmission connections to other supply centers, distributed generation provides the primary near-term source of competition.

Streamlining interconnection through national rulemaking would be a valuable contribution by the FERC.

**2. Interconnection approval difficulties may not be a primary barrier to widespread use of small wind systems in some areas, but they do limit and delay market penetration in others.**

The primary barrier to more widespread adoption of small wind turbines is economics. Policymakers and the industry are addressing the cost barrier with smart subsidies (at the State level, so far), advanced technology, and increased manufacturing investments. For our industry at least, interconnection costs in time and materials is a secondary or tertiary issue that occasionally flares up to a major issue on a particular project or in a certain niche market.

Small wind systems are provided special rights under PURPA 210 and most every utility prepared PUC-approved interconnection contracts and buy-back rate schedules for QF's of 100 kW or less in and around 1981. Thousands of intertied small wind generators were installed in the early 1980's under PURPA 210 and the federal and state tax credits then available.

Today, most utilities approach interconnection of small wind systems in a reasoned and largely non-discriminatory manner. The occasional flare-ups, on the other hand, can be maddening in their blatant disregard for the law and raw abuse of market power. When weak or disinterested PUC's won't intervene, these disputes can rage on

for months and cost us days of lost productivity. While we have never failed to get a system interconnected, our customers have, on occasion, had to install unnecessary equipment, purchase unnecessary supplemental insurance, and sign on to egregious terms and conditions. The doubly maddening part is that these rogue utilities spend “unlimited” ratepayer money to thwart ratepayer rights, while we are forced to spend our corporation’s money to defend ratepayer rights.

For reference we have appended two fairly recent customer support responses that illustrate the kinds of contractual difficulties we get dragged into. Not all utilities are well-meaning, but even those that are can impose significant workloads on customers and suppliers by starting with 100 page model contracts written to cover 500 MW QF’s. The burden of winnowing these monsters down to the “necessary and sufficient” falls largely on suppliers like Bergey Windpower because we are the party to the transaction with the most experience. These repetitive and insipid workouts drain our budgets and our energy. Utilities also waste tremendous time reinventing the wheel and responding to our complaints.

**3. There is now a wide body of experience with very small (1 – 20 kW) distributed generation systems and the track record proves that they can be easily and harmlessly integrated into the existing national power grid infrastructure.**

Small wind systems have been intertied to the utility grid since 1975 using inverters (power electronics that convert direct current to alternating current) and since 1977 using induction generators (induction motors that are sped up past their synchronous speed to become generators). Thousands have been installed on hundreds of IOU’s,

coops, and muni's, and these systems have accumulated over 500 million hours of interconnected operation. Likewise, thousands of interconnected solar systems are now in operation, although these tend to be newer installations compared to small wind systems. Through it all there has never been a documented case of injury to utility linemen and the few instances of power quality impacts (e.g., noise on phone line or clocks running fast) have been easily remedied.

In our experience, the instances where the operation of a small wind system brings to light a utility problem far outnumber the instances where the small wind system causes a problem. Typical utility problems are insufficient service drop capacity, insufficient feeder capacity (customers close to the substation experience high line voltage set that way to keep customers at the end of the feeder from receiving voltages too low), inadequate surge protection, excessive voltage sags (brownouts), high harmonics, poor power factor, and numerous esoteric infrastructure weaknesses (e.g., malfunctioning reclosers).

**4. The existing technical standards are not only sufficient; they are “gold plated”.**

The emergence of national technical standards for interconnecting small generators has been widely acclaimed, but the reasonableness of these standards has not been adequately addressed. The development of IEEE 929-2000 and UL 1741 were largely collaborations between utilities, subcontractors to the US-DOE photovoltaics research program and testing entities. We fully support the need for national standards and find much in the existing standards that we believe is reasonable. But, we also find

provisions that go well beyond the “necessary and sufficient” criteria. These “gold plated” provisions raise costs without delivering incremental value to the marketplace.

Three examples are the anti-islanding requirements, the power quality requirements, and the voltage set-points. Islanding is the phenomena where a distributed generation system fails to shut-down during a utility outage, thereby presenting a safety risk to the public and utility personnel. Small interconnected wind systems, going back to the first installations in 1975, have included redundant systems for ensuring that islanding is prevented. Long before the IEEE and UL standards were developed, the U.S. tort system and the prospects of a wrongful death judgment were all the incentive the industry needed to provide a “belts and suspender” approach to safety. To the extent that the new standards codify existing design intent they are fine. The problem is that the standards now require anti-islanding protection that goes beyond the real world environment and extends into the artificial world of laboratory simulations. All parties agree that the likelihood of some of these conditions (high capacitance, low impedance, load exactly following generator output, etc.) ever existing in the real world are low in the extreme, but there have not been enough voices questioning the need to pay for these additional protections and they have made their way into the code.

Both IEEE 929-2000 and UL 1741 require small generators to meet the power quality thresholds in IEEE 519. In general, this requires that the sine wave output from these systems have no more than a 5% total harmonic distortion and that they operate at a power factor of 98% or better. The effect of imposing this standard is to require small generators to delivery electricity that is substantially higher in quality than the utilities often deliver to customers. Utilities would never agree to meet this requirement at the

“point of common connection”, so it provides an asymmetric mandate that substantially raises the costs of very small systems (see next comment).

The power quality environment where distributed generation lives is not so much dictated by the high standards of power quality at the busbar of the central power plants, as the low standards that utilities place on customer load characteristics out on the network. Dimmer switches, computer power supplies, variable speed drives, florescent light ballasts, millions of induction motors, etc. diminish power quality and will always, always have a bigger effect on power quality than distributed generation. Until IEEE 929 and UL 1741 caused us to change our technology, the inverters we fielded were line-commutated SCR (silicon controlled rectifiers) devices that essentially put chunks of current into the utility line twice per cycle. This lowbrow, but robust technology operates at total harmonic distortion up to 65% and at lagging power factors as low as 60%. While this sounds terrible, these parameters are not out of line with the characteristics of consumer loads that equally affect utility power quality.

The voltage set-points, where disconnection from the grid is required, are tight and absolute (as opposed to being relative to utility line voltage) in IEEE 929-2000 and UL 1741 and they regularly cause nuisance faulting because the utility lines are less “stiff” and nominal voltages vary more than assumed in the standard. We have customers with nominal line voltages of 126-127 VAC, providing little headroom from the 132 VAC disconnection point for the standards. Hopefully, future updates of the standards will provide a remedy for this situation. We only bring it up here to back-up our contention that the existing standards are more than sufficient.

**5. Very small systems, up to 15 kW, shouldn't be held to the IEEE 519 power quality standard.**

Increasing the power quality of an inverter to meet IEEE 519 requires a much more sophisticated device with more components, more expensive components, and tremendously more complex control software. This is true whether it's a 1 kW wind turbine connected to a home or a 900 kW wind turbine connected to a factory. The basic inverter architecture and the software will be the same (or very similar); just the current carrying capacity of the components is different. The impact of this is that for the very smallest of systems the costs of compliance are disproportionately increased.

For the last two years Bergey Windpower has struggled to either develop or buy a ~ 1.5 kW IEEE 519 compliant inverter to pair with or new advanced technology 1 kW wind turbine. Our small wind turbine competitors have also engaged in the same struggle for their similarly sized turbines. The major problem is that the costs for such a device are more than the costs of the wind turbine itself, so the resulting price point becomes non-competitive. The ex-factory price of small wind turbines in the range of 1 kW (8 – 10 ft. rotor diameter) without electronics is now below \$1,000/kW. The costs for suitable grid-intertie inverters that comply with IEEE 519 are ~ \$1,200/kW and modifications to make these PV-market devices be reliable with small wind turbines can raise the costs to over \$1,500/kW. This contrasts to the old SCR, IEEE 519 non-compliant, technology that costs \$400/kW and has been successfully deployed for more than two decades. If we can't find cost-effective small inverters that meet interconnection technical standards then all of our efforts to make cost-effective small wind turbines for homeowners, farmers, and small businesses will come to naught.

We recommend that very small distributed generation systems, at least up to 15 kW, be exempted from IEEE 519 unless the utilities symmetrically require and enforce the same power quality impact standards on all customers. Doing so at the federal level would save countless hours of effort that would be required to address this barrier to competition at the state level. We also intend to campaign for a change in IEEE 929-2000, but the ability of utilities to game this process gives us little confidence that this represents an effective remedy.

**6. On small systems, additional insurance coverage should not be required of the consumer.**

Twenty years ago utilities learned that they could indirectly thwart the legislative intent of PURPA 210 by imposing contractual requirements that raised the costs of customer-owned generation out of the competitive range. A favorite tactic was the requirement for liability insurance coverage that was well above that which is typically carried by homeowners and farmers, and which required special riders on otherwise conforming business policies. For example, Colorado was an active market for small residential wind systems in 1983. In late 1983 Colorado utilities, starting with rural cooperatives, began requiring a \$1 million liability policy as part of their standardized interconnection agreement. The average cost of this special policy was \$1,200 per year while the average savings from a \$10,000 (after tax incentives) investment in a residential wind system was also ~ \$1,200 per year. Sales in Colorado declined by 95%.

The scope of experience with very small customer-owned generation covers 25 years and more than a billion hours of operation. In that time there has never been a

fatality attributable to these generators and we can't even find evidence of an injury. Yet we still continue to see requirements of \$1 - \$5 million liability insurance policies in contracts for small generators. Five states have explicitly banned additional insurance requirements and numerous PUC's have supported consumer efforts for relief on a case-by-case basis, but the situation begs for a comprehensive national solution. In our experience, the rural electric cooperatives have been the worst offenders.

The unfair imposition of extra insurance is one of the factors behind the emergence of the "guerrilla solar" movement, where interconnected customers purposely hide their (mostly solar) renewable energy systems from their utility. A review of back issues of Home Power magazine provides interesting vignettes of these otherwise law-abiding consumers. Please note that these micro-systems use the same electronics to interconnect as "non-guerrilla" installations, so there's no added safety risk from these systems.

**7. Experience with the new Texas PUC interconnection rules shows that the devil is in the details.**

The Texas Public Utility Commission Requirements for Pre-Certification of Distributed Generation Equipment by a Nationally Recognized Testing Laboratory", Project No. 22318, provide, in our opinion, an imperfect model for standardized interconnection requirements. Pre-certification is a good concept, but additional work is needed on the details to provide effective savings in compliance and approval costs. We have experience in installing 10 kW small wind turbines on the same Texas utility before and after Substantive Rule §25.211(c)(12)(k), which mandates pre-certification, was

adopted and we have not seen any reduction in required effort. Fortunately, for our customer, and us, the utility in question granted us a waiver from meeting the new pre-certification requirements. Had they not, the latest 10 kW system would not have been installed because the cost of compliance would have exceeded the cost of the complete installation.

For example, the Texas voltage set-points are different from the national standards our 10 kW inverters (supplied by Xantrex Technologies) are UL certified to. The table below illustrates these differences. Please note that the IEEE 929 uses an absolute voltage reference, while the Texas rule uses a relative voltage reference (with 120 V nominal assumed).

<b>IEEE 929-2000</b>		<b>Texas Pre-Certification</b>	
<b>Voltage Range</b>	<b>Max. Trip Time</b>	<b>Voltage Range</b>	<b>Max. Trip Time</b>
V < 60	6 cycles	V < 84	20 cycles
60 < V < 106	120 cycles	84 < V < 108	1810 cycles
106 < V < 132	Normal Operation	108 < V < 126	Normal Operation
132 < 165	120 cycles	126 < V < 132	1810 cycles
165 < V	6 cycles	132 < V	20 cycles

In the opening stages of a market like Texas, where there are no subsidies for purchasers and moderate retail utility rates, there will be few sales and the good intention of pre-certification can, if requirements are not synchronized with other venues, have the unintended consequence of raising barriers to interconnection approval. For reference, the costs of having a “nationally recognized testing laboratory” certify an inverter to the Texas requirements would cost approximately \$30-50,000. In addition, due the special

nature of a spinning wind turbine rotor, the noise test required in C4.4 might cost an additional \$10-20,000 if done by an NRTL. How audible noise relates to utility safety is unclear.

In New York the PSC has taken the IEEE 929 standards and upped the ante by requiring additional fault condition tests. So inverters certified to “national” standards don’t pass muster in either New York or Texas.

Our view is that this stuff sounds more complex than it really is and that electricity is electricity no matter what State a customer lives in. We see no reason that a technical conference refereed by a technically savvy and unbiased small panel couldn’t set national technical standards that work for all parties. We hope our examples have shown that there are good reasons for setting and applying national standards.

#### **8. Existing installations need to be “grandfathered”.**

As previous mentioned there are thousands of working very small interconnected systems that were installed before the current “national” standards were developed. Requiring these systems to be upgraded to the new standards would unnecessarily burden those customers. This wagon isn’t broken and it doesn’t need fixing.

#### **9. Utilities have overstated the risks to their personnel from small wind and solar systems.**

Utilities, in the very general sense, have made a mountain out of a molehill concerning the issue of lineman safety. In venue after venue, forum after forum, and proceeding after proceeding, utilities have justified any number of unreasonable distributed generation requirements in the name of lineman safety. After 25 years of

experience one has to ask: Where's the beef? Where's the history of injury and loss that we must be carefully protected from?

We'd like to make three quick points on this issue: 1) utilities don't share the same concerns about small back-up gas generators even though they are much more widely implemented and they are specifically purchased to operate during the times that utility repairmen are working; 2) the first step in every lineman's safety manual is the requirement that both ends of the line they are working on be grounded, which negates the possibility that a customer owned generator could energize the line, and 3) in spite of the fact that every single one of our installations has an accessible disconnect switch we do not know of a single instance where a utility line crew has locked out one of our wind turbines while working on the lines.

### **Requested Relief**

Based on the record in this docket, including the ANOPR process and comments in response to the NOPR, Bergey Windpower urges the Commission to adopt the IPs and IAs proposed in the comments filed today by SEIA, USFCC, and ASES. If the Commission determines that there are technical issues that remain to be resolved related to these documents, as we believe there are, we request that the Commission hold a technical conference on those issues and invite additional comments on them within 30 days of the conference.

Respectfully submitted by:

Michael J. Bergery

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## **Appendix**

Mike Bergey  
Bergey Windpower Co.  
September 27, 2001

Comments on Ameren Co. Protection Requirements for Parallel Operation of Small-size Generating Facilities 100 kW or Less, dated 5/24/00

Page 1, Section I-A(2): The Ameren documents should not supercede the NEC, local codes, or generally accepted national standards such as IEEE 929-2000 and UL 1741. The utility has no jurisdiction on the wiring on the customer side of the utility meter. This notion applies to other sections of this document.

Page 1, Section I-A(3), B(2), and B(3): The Bergey GridTek 10 inverter is UL-listed to IEEE 929-2000, UL 1741, and IEEE 519. That is more than sufficient for Ameren.

Page 2, Section I-B(4) and B(5): Approvals must be provided in a timely, non-discriminatory manner. Two weeks is sufficient for such a small insignificant generator such as a Bergey 10 kW wind turbine. Given the wide use of these systems and the total lack of any safety issues over the last twenty-five years, any foot-dragging by the utility must be seen as primarily anti-competitive behavior. In most jurisdictions the utility is invited to witness, at there own costs, the commissioning of the system (flipping the breaker), but no written approvals are required.

Page 2, Section II, third paragraph: The requirement for built-in test capabilities is inappropriate for small devices such as a 10 kW inverter system because the costs to add such capabilities would exceed the total cost of the wind generator system. No other jurisdiction requires this. IEEE 929-2000 and UL 1741, the primary safety standards for small PV and wind generators, do not require this. Twenty-five years of experience with interconnected small systems has not indicated a need for this expensive test capability.

Page 3, Section II-A(3) (a) and 3 (b): Settings should be consistent with IEEE 929-2000 and UL 1741.

Page 4, Section II-A(3) (c): Eliminate, illegal. Federal law, PURPA Section 210, allows customer with small wind systems to export excess energy to their utility and requires the utility to pay them for it.

Page 4, Section II-4: There is no technical justification to requiring a dedicated transformer for customer owned generators above 10 kW. It is a discriminatory market barrier designed primarily to raise the costs of alternatives to utility power.

Page 4, Section II-D: Eliminate or revise to solely reference IEEE 519, the generally accepted national standard for power quality. Please note that Ameren is not stating that their power will comply with these same standards – an unbalanced requirement.

Note: This document applies to larger generators as well and Ameren does provide a process for requesting waivers to any of their requirements. If they are willing to work constructively with customers with smaller, well-established equipment, then the cited problems could be easily overcome. Once they have more experience with small generators I would expect that like other utilities they will become more comfortable and less restrictive.

Comments on the Ameren Parallel Operating Agreement

General Comment: This document was written with much larger facilities in mind. This “one size fits all” approaches provides a number of provisions that are just not appropriate for very small renewable energy generators installed under PURPA 210.

Page 7, Section 4-A(2), A(3), A(6), and A(7): Eliminate, not appropriate for a 10 kW wind generator.

Page 12, Section 5-A(1-4): Eliminate, not appropriate for a 10 kW wind generator

Page 13, Section 5-C(1-2): Eliminate, not appropriate for a 10 kW wind generator

Page 14, Section 5-F: Eliminate, not appropriate for a 10 kW wind generator

Page 17, Section 11: Eliminate, customer should maintain full recourse/access to the state public utility commission and to appropriate courts.

Page 18, Section 12: Eliminate. This is an absolutely outrageous insurance requirement that would cost more than the annual savings from a 10 kW wind turbine. There is no justification for any additional insurance beyond what prudent homeowners and businesses normally carry and requiring it would be discrimination under PURPA 210. A mutual, balanced, hold-harmless clause is all that is needed. For reference, with twenty-five years of experience at thousands of interconnected sites there has never been a wrongful injury or death caused by the electrical system of a small wind turbine. A number of states, including Oklahoma, specifically forbid utilities from requiring any additional insurance.

Page 19, Section 13: Eliminate. There is no reason to limit liability or damages, for either party.

Page 19, Section 14: Rewrite to make the provisions simpler and fully balanced between the parties (14-A and 14-B are not balanced).

Page 21, Section 16: Eliminate, unnecessary and not appropriate for a 10 kW wind generator installation.

Page 25, Section 17-I: Eliminate, unnecessary and not appropriate for a 10 kW wind generator installation.

Page 26, Section 17-M: Eliminate, unnecessary and not appropriate for a 10 kW wind generator installation.

Note: This document applies to larger generators as well and Ameren does provide a process for requesting waivers to any of their requirements. If they are willing to work constructively with customers with smaller, well-established equipment, then the cited problems could be easily overcome. Once they have more experience with small generators I would expect that like other utilities they will become more comfortable and less restrictive.

### **Comments on the tariff for Qualifying Facilities, dated January 16, 2001**

I seriously doubt that the rates specified are anywhere close to the true "avoided costs" referenced in PURPA 210. Chances are that the utility has 1) not recalculated for a while and 2) has gamed the calculations in their favor (e.g., neglect T&D savings, use historic facilities costs rather than "next plant" costs, used the capacity costs of gas plants and the fuel costs of coal plants (rather than using both the capacity and operating costs of either gas or coal), etc.

If Ameren proposes to charge an additional monthly customer charge that is not charged to the same class of customers without Qualifying Facilities then this would be "discriminatory" and illegal under PURPA 210.

The technical requirements in this tariff differ from those in the other Ameren documents and, in general, are more appropriate for a 10 kW wind generator.

Please point out to Ameren and your PUC that the primary reason that 33 states mandate net metering for small wind and solar systems is that it saves substantial administrative costs at the utilities. It will cost Ameren \$50-\$100 to process your special account manually to send you what might be a check for \$1-2.

Do this every month and it doesn't take long for net metering to look pretty attractive. Many utilities have chosen to offer net meter before required to do so for this very reason.

*FAX at Bank:  
641-497-5331  
Hardin County Savings*

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**IES UTILITIES INC.**

**ALTERNATE ENERGY PRODUCTION  
ELECTRIC SERVICE AGREEMENT**

**ALAN STAPLES**

*Michelle Aranson  
lawyer with Alliant*

This Agreement is made this \_\_\_\_\_ day of August, 2001 by and between IES Utilities Inc. (a wholly owned subsidiary of Alliant Energy Corporation), its successors or assigns, ("Company"), and Alan Staples, 25231 310<sup>th</sup> Street, New Providence, Iowa, 50206, Telephone (641) 497-5799 ("Customer").

**IN CONSIDERATION OF** the following terms and conditions, the parties agree as follows:

1. Customer may install and operate a qualifying alternate energy production facility and associated equipment ("AEP facility"), which will generate electric energy for sale to Company at Customer's location. The AEP facility will be located in Company's service territory, in the Providence Township, Hardin County, Iowa.
2. Customer shall submit schematic drawings and the manufacturer's manual for the AEP facility and associated equipment. This information shall be reviewed and approved in writing by Company prior to connection with Company's facilities. Customer shall also notify Company of any changes made to the equipment installed at any time during the term of this Agreement.

**Company assumes no liability for Customer's equipment or with any latent defects in the same.**

3. Customer shall <sup>install</sup> ~~operate~~ the electrical generation system as specified in Exhibit 1 (attached hereto and made a part hereof). ~~Violation of this Paragraph 3 shall be just and reasonable cause for Company to immediately disconnect Customer from Company's electric distribution system until such time as Customer has cured the violation, and if such violation is material, to terminate this Agreement pursuant to Paragraph 23.~~
4. Customer's AEP facility shall have the same voltage and phase characteristics as the service supplied by the Company. Company may require Customer, at Customer's expense, to install and operate necessary facilities, initially or at any time thereafter, so that power and energy flowing from the Customer's electric system to Company's electric system will have electrical qualities comparable to the electric service normally supplied by the Company. These facilities ~~shall~~ <sup>may</sup> include equipment to regulate voltage, current, power factor, purity of voltage, and

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ALAN STAPLES

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current sine wave forms. If the power factor falls below ninety (90%) percent or is greater than ninety-eight (98%) percent of unity at the interconnection, or if the voltage, current, purity of voltage, and current sine wave forms are ~~not in conformance with those supplied by the Company~~, the AEP facility may be temporarily disconnected from Company's electric distribution system until ~~performance to system requirements is restored~~. ~~This is unacceptable~~ <sup>conformance to WEC.</sup>

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found to  
cause an  
unusual  
reduction  
in the quality of service  
to our  
neighboring  
customers  
of the Company

5. Customer shall construct interconnection facilities specified in Exhibit 2 (attached hereto and made a part hereof) to Company's material and construction standards. ~~Electricity shall not be delivered from the AEP facility to Company until Company notifies Customer in writing that the interconnection facilities specified in Exhibit 2 are constructed to the satisfaction of Company.~~ Customer agrees not to modify interconnection facilities specified in Exhibit 2 without prior written consent from Company. Violation of this paragraph shall be just and reasonable cause for Company to immediately terminate this Agreement.

notification of  
right to inspect & be  
present during commissioning

X 6. The Customer's tower(s), if any, shall be located at least a distance of one and one-half (1.5) times the total tower and turbine height (as measured to the top of the blade in the 12 o'clock position) from Company's lines or equipment so as to avoid the possibility of the tower(s) or associated structure(s) falling into or making contact with Company's lines or equipment. Customer assumes full responsibility to ensure location of tower(s) and associated installation(s) comply with all zoning laws and other applicable ordinances, codes, or laws.

not appropriate  
for interconnection  
agreement & technical  
not justified

X 7. The Customer shall be responsible for making any necessary changes in Customer's equipment or interconnection covered under this Agreement, including equipment specified in Exhibit 2, at Customer's expense to accommodate changes in Company's transmission or distribution system or regulatory requirements.

X 8. Customer shall, at its own expense, secure any work permits, labor permits, tax exemption certificates, and any other authorization which may be required to construct the AEP facility. Customer shall ensure that all Customer-owned equipment complies with all zoning laws and all other applicable ordinances, codes, or laws.

not appropriate

★  
NO!  
There have  
not been  
9. During the period of this Agreement, the Company shall be entitled to any and all emission credits and allowances generated by or associated with the generation of energy from the AEP facility. Such emission credits and allowances shall include, but are not limited to, those emission credits and allowances for reduction of sulfur dioxide, other sulfur compounds, acid rain precursors, methane, carbon monoxide, chlorinated hydrocarbons, other carbon compounds, nitrogen-oxygen compounds, other greenhouse gases, other ozone precursors, particulate matter, metals and toxic air pollutants, but specifically excluding carbon dioxide allowances already accruing to Customer. Nothing contained herein shall limit Customer's sole

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responsibility for compliance with all applicable environmental laws and regulations.

10. Company will endeavor to supply, but does not guarantee, uninterrupted service of a generally accepted standard. Interruptions of service for repairs, alterations, want of supply, conditions on Customer's premises dangerous to persons, property or service of the Customer or others, and regulatory requirements, shall not be a breach of Company under the terms of this Agreement. Company shall make reasonable efforts to avoid interruptions of service, but when interruptions occur, service shall be reestablished within the shortest time practicable, consistent with safety.

Customer agrees to defend, indemnify and hold Company, its officers, employees, and agents harmless against any and all claims, liabilities, damages, losses, costs, or expenses of whatever nature or character for all injuries or damage of any type to any person or property, including but not limited to injuries or damage of third parties or employees of both parties and employees of Subcontractors, and environmental claims, arising out of or in any way connected with the installation, inspection, maintenance, testing, and operation of the Customer's AEP facility pursuant to this Agreement, provided, however, that nothing contained herein shall limit the Company's responsibility for personal injury and property damage claims to the extent such claims or damages arise directly out of the negligent acts or omissions of Company, its officers, employees and agents. This paragraph shall survive termination of this Agreement.

*\*  
Both parties  
agree to hold  
each other  
harmless . . .*

11. Customer shall provide and maintain Public Liability and Property Damage Insurance so as to provide protection and indemnification against any and all such claims or suits in connection with this Agreement. Customer shall furnish to Company certificates issued by insurance companies acceptable to Company showing policies carried and the limits of coverage as follows:

*existing  
liability insurance  
should suffice*

Workers' Compensation Insurance for Customer's employees (if any) to the extent of statutory limits and Occupational Disease and Employer's Liability Insurance for not less than \$500,000.

Comprehensive General Liability Insurance, including but not limited to Products and Completed Operations and Contractual Liability, as applicable to Customer's obligations under this Agreement with limits not less than:

Personal Injury - \$1,000,000 per occurrence and

Property Damage - \$1,000,000 per occurrence.

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Certificates of insurance shall be on file with Company prior to execution shall remain in effect for the duration of this Agreement. All certificates of insurance shall state that prior to cancellation, non-renewal or any material change, thirty-(30) days' written notice shall be given to Company. Failure of Company to enforce the minimum insurance requirements listed above shall not relieve Contractor of responsibility for maintaining these coverages.

12. Electric service supplied by Company to Customer shall be billed pursuant to Company's tariff on file with the Iowa Utilities Board. Nothing contained herein shall be construed as affecting in any way the right of the Company to make unilateral application to the IUB or any successor agency for changes in such rates, rules and regulations under Chapter 476, Code of Iowa, 1999 and pursuant to the IUB's Rules and Regulations promulgated thereunder.
13. This Agreement shall be subject to all rules and regulations of regulatory authorities having jurisdiction as they may be changed from time to time and to those rules and regulations of Company now or hereafter on file and approved by the IUB.
14. Company shall require two (2) meters to separately meter the Customer's monthly electric consumption and the amount of energy produced by the AEP facility. For the amount of electricity generated that is equal to or less than the amount of electricity used by the Customer in the billing period, the kilowatt-hours (kWh) generated shall be deducted from the Customer's consumption prior to applying the Tariff Price for the billing period as set forth in Exhibit 3 attached hereto and incorporated by this reference. For the amounts of electricity generated in excess of the amount of electricity used by the Customer in the billing period, the Company shall pay customer \$0.02 per kWh.
15. This Agreement shall be subject to the IUB's Order Requiring Interconnection and Granting Waivers issued on August 4, 2000 as set forth in Exhibit 4, wherein the IUB authorized Company to collect the payments and lost revenues incurred by Company pursuant to this Agreement from customers through Company's energy adjustment clause. The IUB Order also states "The waiver, however, will be limited in duration and the issue may be revisited pending final resolution of the court proceeding or passage of any federal or state restructuring legislation." Therefore, should future orders or rules result in Company's inability to collect such payments or lost revenues, the price paid for energy generated by Customer shall automatically be reduced to ~~the amounts allowed to be collected through the energy adjustment clause.~~ "avoided costs" per PURPA 210.
16. Other provisions of this Agreement notwithstanding, in the event the provisions of the Public Utility Regulatory Policies Act of 1978 (PURPA), 16 U.S.C. 2601, et seq. and 18 CFR Part 292; or Federal Energy Regulatory Commission (FERC) rulings;

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or current Iowa Code Sections 276.41-45 (Iowa AEP Legislation); or Chapter 15 of the Rules of the Iowa Utilities Board (AEP Rules) are repealed, nullified, interpreted or modified during the term of this Agreement, or in any other circumstance, including but not limited to the advent of customers being given the right to choose their electric supplier, that Company or its successors is not allowed to automatically recover its full cost of AEP power pursuant to this Agreement, the price paid for such power shall be immediately and automatically modified so as to equal the amount ~~Company or its successors is allowed to collect from customers.~~ "assured cost"

*most clause like # 10 giving customer special rights to meet & better policies*  
X  
*not required of non-operating customers*

17. Customer agrees that it will provide Company (whose employees, agents or Subcontractors in the performance of this Agreement may be exposed to Customer's equipment) with the same Hazard Communication Information Customer is required to provide to its own employees pursuant to any laws or regulations.

Customer shall defend, indemnify, and hold Company harmless from any loss, liability, or claims resulting from the Customer's failure to comply with this clause.

18. COMPANY SHALL NOT IN ANY EVENT OR UNDER ANY CIRCUMSTANCE WHETHER IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE) OR UNDER ANY OTHER LEGAL THEORY, BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS OR REVENUE, LOSS OF USE OF SITE SYSTEMS, COST OF CAPITAL OR CLAIMS BY THE CUSTOMER FOR DAMAGES TO CUSTOMER'S CLIENTS, IF ANY.

X  
*why should customer cover these risks?*

CUSTOMER AGREES TO INDEMNIFY AND HOLD COMPANY HARMLESS FROM ANY CLAIMS, LAWSUITS, ACTIONS, LOSSES OR LIABILITY ARISING FROM OR IN CONNECTION WITH ANY CUSTOMER FURNISHED INFORMATION WHICH IS DEFECTIVE, ERRONEOUS OR UNSUITABLE FOR THE PURPOSE INTENDED.

19. Customer may, with Company's prior written consent, assign this Agreement if the successor or assignee thereof agrees in writing to assume all Customer obligations hereunder.

X  
*NOT, they should have to negotiate or give prior permission*

20. Company is granted the right to install, repair, maintain, and inspect supplemental metering equipment, at its expense, in order to gather data from the AEP facility. Such data may be used in proceedings before the IUB and other appropriate authorities. All data will be made available to the Customer and/or Recipient upon request and for appropriate compensation.

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21. Customer shall be responsible for operating and maintaining the interconnection facilities specified in Exhibit 2. Maintenance documentation and test reports shall be furnished to Company upon request. Customer agrees to allow Company to test or inspect interconnection facilities upon Company's request and at mutually agreeable times.

? 22. Customer hereby grants to Company full rights of ingress and egress to the AEP facility over and across presently established roadways for all purposes that are set forth in this Agreement.

*outdoor equip  
of the*

23. In the event of a material breach of any of the terms and conditions of this Agreement, either party may terminate this Agreement or seek whatever equitable or legal remedies it might have.

X  
small  
easy to have  
must breach with  
not affect

24. This Agreement shall be effective for a term of ten (10) years beginning on the \_\_\_\_\_ day of August 2001.

25. All communications related to this Agreement shall be to the person listed below or to such other persons as the parties may specify in writing:

Kathy Lipp, Director Regulatory Affairs and Restructuring IES Utilities Inc. P.O. Box 351 Cedar Rapids, Iowa 52406	Alan Staples 2523 1/2 310 <sup>th</sup> Street New Providence, IA 50206
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X 26. Any disputes not settled by the management of the parties shall be settled by arbitration in accordance with Chapter 679A of the Iowa Code (Arbitration). The laws of the State of Iowa shall govern this Agreement and venue shall be in Linn County, Iowa. The parties' obligation to perform under this Agreement shall remain in effect during the resolution of disputes.

*no reason to  
require arbitration*

X 27. The failure of Company to insist on or enforce, in any instance, strict performance by the Customer of any terms of this Agreement, or to exercise any rights herein conferred shall not be construed as a waiver or relinquishment to any extent of its right to assert or rely upon any such terms or rights on any future occasion.

*no, they must  
show consistent  
enforcement*

28. Each term and condition of this Agreement is deemed to have independent effect and the invalidity of any partial or whole paragraph or article shall not invalidate the remaining paragraphs or articles. The obligation to perform all of the terms and conditions shall remain in effect regardless of the performance of any invalid term by the other party.

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29. This Agreement represents the complete understanding of the parties and shall govern over all other documents and oral representations making all other representations of the parties null and void. The terms and conditions of this Agreement shall govern the following documents which are a part of this Agreement:

- Exhibit 1 – ELECTRICAL GENERATION SYSTEM
- Exhibit 2 – INTERCONNECTION FACILITIES
- Exhibit 3 – BILLING EXAMPLES
- Exhibit 4 – IUB ORDER REQUIRING INTERCONNECTION AND GRANTING WAIVERS

This Agreement is executed the day and year first above written at Cedar Rapids, Iowa.

**IES Utilities Inc.**  
(a wholly owned subsidiary of  
Alliant Energy Corporation)

**Alan Staples**  
Customer

By \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

Print name: \_\_\_\_\_

Print name: \_\_\_\_\_