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RUDY STEGEMOELLER

Attorney at Law
P.O. Box 359
Poestenkill, NY 12140
(518) 283-0933
rudysteg@capital.net

Office of the Secretary
Pennsylvania Public Utility Commission
P.O. Box 3265
Harrisburg, PA 17105

January 24, 2005

Re: Docket No. L00040168: Advance Notice of Proposed Rulemaking Regarding Small Generation Interconnection Standards and Procedures

Dear Sir/Madam:

Please find enclosed an original and fifteen copies of the Comments of Plug Power Inc. regarding the above-captioned proceeding.

Sincerely,

Rudy Stegemoeller, Esq.
P.O. Box 359
Poestenkill, NY 12140
518-283-0933
rudysteg@capital.net

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STATE OF PENNSYLVANIA
PUBLIC UTILITY COMMISSION

Advance Notice of Proposed Rulemaking	)	
Regarding Small Generation	)	**Docket No. L00040168**
Interconnection Standards and Procedures	)	

COMMENTS OF PLUG POWER INC.

INTRODUCTION

Plug Power Inc. appreciates the opportunity to comment on the Commission's interconnection initiative. Plug Power has been active in several other state and federal proceedings regarding interconnection standards.

Plug Power is a designer, developer and manufacturer of on-site energy generation systems utilizing proton exchange membrane fuel cells for stationary applications. Plug Power is based in Latham, New York. Plug Power's fuel cell systems for small stationary commercial applications have been delivered to select customers through a joint venture with the General Electric Company, and fuel cell systems for residential and small stationary commercial applications are expected to be sold globally through a joint venture with the General Electric Company, and through DTE Energy Technologies.

THE IMPORTANCE OF INTERCONNECTION STANDARDS TO THE SMALL DG INDUSTRY

It is essential for the growth of the distributed generation ("DG") industry that interconnection standards be not only *safe* but also *cost-effective* and *standardized.* For manufacturers of small DG such as fuel cells, photovoltaics, and microturbines, this is particularly important. As used throughout these comments, "small DG" will refer to projects of 25 kW and smaller, although various jurisdictions have drawn this line anywhere from 10-30 kW.

On a dollars-per-kilowatt basis, the cost of unreasonable interconnection requirements for a small DG project can be disproportionately large, approaching the entire capital cost of a large gas turbine project. For example, prior to New York's refinement of its Standardized Interconnection Requirements in November of 2002, Plug Power experienced costs for interconnecting its 5 kW fuel cells that sometimes exceeded $1500 per unit. Interconnection costs of $300 per kilowatt, clearly, destroy the long-term economic viability of small DG projects. An interconnection process that is "streamlined" when applied to larger rotating equipment, involving "only" a few hours of engineering review, will place a large and unnecessary burden on small DG projects.

Standardization is also particularly important for small DG. It is inefficient for small DG projects to be custom-manufactured to meet unique technical specifications of individual jurisdictions. Manufacturers must be able to produce DG products, including interconnection equipment, that meet universally applicable standards.

BARRIERS PRESENTED BY INTERCONNECTION PROCESSES

Safety is the primary goal of an interconnection process. Safe interconnections can be accomplished without raising unreasonable barriers to entry of new technologies. Plug Power units have operated for over two million hours, and other small DG systems across the United States have logged additional millions of hours, without adverse impacts on distribution systems or other utility customers.

Barriers typically presented by interconnection processes include:

- Cost: As described above, an interconnection process that is based on individual analysis of each project can create prohibitive costs for small DG projects on the order of $200-300 per kilowatt.
- Lack of uniformity: Manufacturers of small DG products cannot profitably tailor their product line for the unique specifications of a variety of jurisdictions.
- Complexity: The complexities of designing electronics to safely perform anti-islanding functions are best handled at the manufacturing level. At the customer level, a small DG project should be a pre-certified package that requires only a simple inspection and verification test.
- Uncertainty: Prior to closing a sale on a DG project to a small customer, contingencies such as the viability of interconnection must be known.
- Delay: For products marketed to small consumers such as residential and small business customers, timeliness of installation is an important customer criterion.

THREE ELIGIBILITY CRITERIA FOR A STREAMLINED INTERCONNECTION PROCESS

Effective interconnection processes will take into account three characteristics that make a small DG project eligible for simplified, low-cost interconnection:

- Size: States have established size thresholds ranging from 10kW to 30 kW, below which a project is eligible for simplified interconnection.
- Certification: As explained below, certification of protective functions by a nationally recognized testing laboratory is the most practical way to establish cost-effective interconnections for small units.
- Dispersion: Effective interconnection standards recognize that small certified DG presents few engineering questions, so long as the amount of DG on a line section is not great. Once the aggregate amount of DG on a line section reaches a high level, there can be concerns about the amount of potential export onto the line, and review may be warranted.

THE IMPORTANCE OF CERTIFICATION

Individual interconnection analysis of small DG projects will never be economically feasible. The alternative to individual analysis is certification of products to anti-islanding standards and other performance standards included in UL 1741 and IEEE 1547. A product that has been certified to these standards can be presumed to operate safely.

Certification can be performed by a nationally recognized testing laboratory, such as Underwriters Laboratories. The manufacturer pays once for the elaborate testing that is done by the laboratory. This is far more efficient than requiring extensive testing of each individual unit at the interconnection stage. A simple verification test, as prescribed in IEEE 1547, is sufficient to assure that the individual unit is functioning properly.

After certification, the only inquiries that are relevant to interconnection will be the aggregate amount of DG on the line section or on a shared transformer.

STATES CITED IN THE ANOPR

Each of the state processes cited in the ANOPR is a good process for interconnection to radial systems. Each provides a streamlined process for small DG projects. The Commission should also consider the process recently adopted by Massachusetts, which along with New York, Texas, and New Jersey provides for a streamlined process with no fees for small projects. Other states, including Minnesota and Wisconsin, have recently adopted processes that exempt small units from fees.

States have adopted two different approaches to small units: a screening process and a less structured "flexible" process. New Jersey, Texas, and Massachusetts have adopted screening processes that contain clear criteria. In each process, a small, certified, inverter-based unit will be entitled to interconnection so long as the aggregate amount of DG on the line feeder (or on a shared transformer) is below a specified threshold.

New York, Minnesota and Wisconsin have adopted a less structured approach which does not contain an objective screen, but instead relies on a fee exemption to ensure that utilities do not engage in needless analysis of small units. As the New York Public Service Commission explained:

> "The intent of this [fee exemption] is to discourage the utilities from performing superfluous and unnecessary system studies, while at the same time encouraging them to operate in as efficient a manner as possible when processing applications of this nature."

New York State Public Service Commission, Case 02-E-1282, Order Modifying Standard Interconnection Requirements, November 6, 2002, page 5.

One benefit of the flexible approach is that even the simplified screening process can be avoided in favor of a common-sense approach. The drawback to the flexible approach is that common sense may not always prevail, in which case state regulators must be prepared to intervene.

Plug Power's interconnection experience under the revised New York rule has been, for the most part, excellent. After the fee exemption was put into place, interconnection of 5-15 kW projects has been fast and without complications. This successful experience reflects the cooperation of utility personnel, as well as the stated willingness of NYPSC Staff to intervene in the event of a disagreement.

It is possible that experience under the "flexible" approach might not be as successful with other utilities or in other states. For that reason, most small DG advocates have tended to favor the more objective screening approach over the flexible approach.

One crucial variable is the degree of familiarity that utility personnel have with interconnection of small units. There is a strong (and understandable) tendency for a utility engineer to want to study the utility interface of a DG project very closely, if it is the first such project that the individual has seen. It is somewhat unfair to demand that utility engineers approve of projects with which they are not familiar, when there is no objective standard in place. On the other hand, DG providers should not have to pay for each utility in the nation to go through the same learning curve. An objective screening process codifies the simplified approach and provides the utility engineer with a clear, objective standard to apply. In no event, however, should a utility be precluded from studying a project further, where extraordinary circumstances raise a legitimate question of safety.

Plug Power recommends that either approach is acceptable, with the caveat that the flexible approach only works if the PUC Staff is prepared to intervene in individual interconnection applications. Until such time as interconnection of small units is widely understood and accepted by utility personnel, an objective screening approach may be the most efficient.

THE FERC MODEL

The preliminary "consensus" reflected in the FERC NOPR of July 24, 2003, has been rendered obsolete by subsequent discussions of the parties to the FERC proceeding. A new partial consensus has been filed by groups representing utilities, rural coops, small generators, and NARUC. This filing can be found at:

http://elibrary.ferc.gov/idmws/nvcommon/NVViewer.asp?Doc=10321851:0

Most important, for purposes of these comments, the new consensus contains a streamlined process for inverter-based units of 10 kW or smaller. Fees are not discussed,

and agreement was not reached on insurance requirements, but otherwise there is agreement among distribution providers and small generators. It is important to note that the "consensus" falls short of the ideal for small generators, mainly because it does not adequately address networks. Nevertheless, in addition to the other states discussed here, the FERC consensus provides an excellent model for the treatment of small projects on radial systems.

INSURANCE

Most states have declined to require DG customers to obtain extra liability insurance. Owners of property with small DG equipment should not be required to obtain additional insurance so long as they are already maintaining liability insurance at customary levels, and so long as that coverage does not explicitly exclude distributed generation equipment. The interconnection process, and the process of certifying equipment under UL 1741, will produce safe interconnections. Requiring additional insurance coverage would, in the case of small customers, create a major disincentive to installation of DG.

NETWORKS

The issue on which most of the state models discussed in the ANOPR, as well as the FERC consensus, fall short is in the treatment of network interconnections. Only New York has taken steps to provide for interconnections in both area networks and spot networks on reasonable terms. This is particularly noteworthy because most of New York City is served by networks, including extensive areas of residential and small commercial customers.

The complication that is cited regarding networks – that export of power from a DG project could trip network protectors – is a valid concern. It is not valid, however, with respect to small inverter-based projects that are dispersed throughout the system in relatively low concentrations. Network protectors will only be in danger of tripping when the output of a DG unit is larger than the minimum load on the network. In the case of a small DG unit, the only time when that would happen is during an outage. But in the event of an outage, the anti-islanding equipment required by IEEE 1547 would isolate the DG unit before it had any impact on the network.

As the New York Public Service Commission stated:

> In the context of a small inverter-based application, it seems unlikely that the backfeed from a 5 kW fuel cell at the residential level, for example, could impact the operation of network protection devices. In a situation where the generation will continue to operate even in the event of a loss of a network feed, which could possibly result in the cycling of network protectors, anti-islanding functions employed with the inverters will serve to interrupt the equipment within several cycles.

New York State Public Service Commission, Case 02-E-1282, Order Modifying Standardized Interconnection Requirements, pg. 12, November 17, 2004.

For this reason, the New York Commission decided that reverse power relay equipment would not be required for small inverter-based projects unless the utility demonstrated peculiar circumstances that warranted the equipment. The exemption from fees for projects 15 kW or smaller also applies to network interconnections, which protects small projects from unnecessary review.

Because networked distribution systems tend to coincide with load pockets where DG is most needed, it is important for the Commission to give close consideration to the issue of network interconnections.

CONCLUSION

A great deal of progress has been made on interconnection processes in recent years. In the long term, the economic viability of small DG depends on the availability of uniform, cost-effective interconnection standards. The Commission is taking the correct approach by trying to achieve consistency with processes that have been developed in other jurisdictions. Plug Power looks forward to working with the Commission in future phases of this process.

Respectfully submitted,

Rudy Stegemoeller, Esq.
For Plug Power Inc.
P.O. Box 359
Poestenkill, NY 12140
(518) 283-0933
rudysteg@capital.net

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