

Mr. Byers,

Thanks for the opportunity to work with the WUTC on small generator interconnection.

I hope I can provide some further clarification on distribution network interconnection. The language that was included in our utility workgroup's proposed standard was developed primarily by our SCL network engineering staff and Paul Della of Pacificorp. IEEE 1547-2003 was used as a guide, and our language is consistent with it. As you probably know, SCL has by far the largest distribution network in the state, and it serves our large downtown customers. Since the cost of this network is relatively high, and the justification for those costs are largely increased reliability, our network engineers are quite sensitive to ensuring that anything attached to it will not compromise that reliability, as are all utilities with them.

Enough background - to your question in the workshop on 12/2.

Our proposed standard that you were referring to in your question to me, for reference:

First, allow me to apologize that I was not as well prepared for your question as I might have been. I had misplaced my copy of the draft standard at the moment you asked. But it may have been as well, because the topic of networks is about as complex and arcane as it gets in interconnection - and most of that group would not have been interested.

As I understand your question, it was about the phrase disallowing any interconnection with distribution secondary *area* networks, (also known as grid or street networks - as found in Chicago, New York and Seattle, for example). These are quite different than the *spot* networks, where we (and other utilities) may allow interconnection with appropriate utility qualification and approval as listed.

First, it is important to understand that all types of secondary distribution networks have protection relays on the points where they are fed from primaries. These relays, called network protectors, are specifically designed to open on reverse current flow. This is a requirement of the network design concept, to avoid faults on any primary being fed from other primaries that are connected through the network to the fault. This impacts distributed generation installed in networks by necessitating that no reverse power flow can occur through the network protectors. So, in any case, no power can be exported from a network.

For any number of reasons, generation interconnection in an *area, or grid* network is extremely problematic. Among the reasons are that, unlike a spot network:

multiple customers are directly connected to an area network, so that, since their loads are changing at all times, the power flow directions in the network are constantly changing. This makes it difficult or impossible to accurately characterize power flow in an area network on a dynamic basis, and so assess generation impact.

Any fault or problem requiring a breaker operation in it is also likely to impact many customers at once.

Finally, the fault current potential in an area network may be very high, as many customers are attached to it.

One result of these realities is that IEEE 1547-2003 does set some terms for DG interconnection to *spot* networks, *but not grid, or area, networks*. Below is the relevant section of IEEE 1547:

4.1.4.1 Distribution secondary grid networks

This topic is under consideration for future revisions of this standard.

I realize that I stated I thought the language was an error in the WUTC Workshop. Following the Workshop, I reviewed the proposed standard language and consulted with the other members of our utility workgroup. The outcomes of that investigation are that the language as written is correct and appropriate in the consensus opinion of our workgroup. Here are our two specific comments:

- 1) We clarify that we do recommend that the language in the standard be retained to disallow any interconnection to area (grid) networks; and,
- 2) that in keeping closely with the IEEE 1547-2003 standard in this matter, we recommend changing references to "secondary **area** networks," to "secondary **grid** networks," and all contextually synonymous use of "**area**" be changed to "**grid**." Tom DeBoer and Larry Bekkedahl have already made this change in language in their proposed rule for interconnection of equipment ≤ 25 kW, as you will note when you receive this from Tom.

I hope this somewhat long winded comment helps clear up this issue to your satisfaction. Please don't hesitate to call or write with questions.

Thanks,

David Van Holde, P.E.
Seattle City Light
206.233.3867