

RESULTS AND RECOMMENDATIONS

Table 1 lists the SMEs receiving the questionnaire and responding to it:

Table 1: Target SMEs

Target SMEs	Questionnaire Recipients	Number of SMEs Completing Questionnaire
IEEE 1547.7 Working Group Only	91	23
IEEE 1547.6 Working Group Only	35	5
Both IEEE 1547.6 and 1547.7 Working Groups	20	7
Solar ABCs Invites	8	2

When we reviewed the responses, we found that roughly two-thirds or more of the SMEs (considered a consensus for the sake of this report) recommended an update of only three of the FERC SGIP screens. Based on this and input from other studies, we recommend that all three of these screens be strongly considered for updating. We also recommend that a fourth very important screen (Screen 2.2.1.2) be aggressively studied to determine how its penetration limit may be increased so that it does not create an unnecessary barrier to PV development or lead to safety or reliability problems. For similar reasons, we suggest studying the size limit of the 10 kW inverter process to determine the appropriateness of increasing it. A discussion of the SME questionnaire responses about these four screens and the 10 kW inverter process is below. Detailed response results of the entire questionnaire are available in Appendix II.

Screen 2.2.1.7: The existing screen is: "If the proposed Small Generating Facility is to be interconnected on single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the proposed Small Generating Facility, shall not exceed 20 kW."

The vote on this screen was 26 for an update versus 6 against, thus showing the strongest support for change of any screen. The change supported by the majority of the SMEs was to base the screen on a percentage of the transformer nameplate power rating instead of a static system size. The comments in favor of an update include, "I do not clearly understand the technical basis of the FERC 20 kW limit. I personally prefer the limit to be based on service transformer nameplate capacity." SMEs opposed to changing this screen said, "Actually, the aggregate capacity of DG installed on a shared secondary should be limited to 10 kW. Simply because there are two customers on a single secondary does not mean that you can safely double the capacity limit of 10 kW. Although the 65% rule applied to a 15 kV transformer limits the aggregate capacity to 10 kW, applying the rule to larger transformer allows the customer to bypass the capacity rules by installing/requesting a larger transformer. As far as safety, I am leaning slightly towards allowing the 65% transformer capacity rule if each customer is constrained to a maximum of 10 kW. Therefore, I am unable to support the change."

There is also a precedent for changing this screen to a percentage of the service transformer nameplate power capacity basis set by New Mexico. Their small generator interconnection procedures have the following screen: "If the proposed Generating Facility is to be interconnected on a single-phase Shared Secondary, the aggregate Generating Facility capacity on the Shared Secondary, including the proposed Generating Facility, shall not exceed 65% of the transformer nameplate rating." Due to the strong SME support in the questionnaire responses and the New Mexico precedent, we

recommend that the FERC SGIP screen on shared secondary be updated to a limit based on service transformer nameplate power capacity.

Screen 2.2.1.9: *The existing screen is: “The Small Generating Facility, in aggregate with other generation interconnected to the transmission side of a substation transformer feeding the circuit where the Small Generating Facility proposes to interconnect shall not exceed 10 MW in an area where there are known, or posted, transient stability limitations to generating units located in the general electrical vicinity (three or four transmission busses from the point of interconnection, for example).”*

This screen received the second highest number of votes for change—24 voted to change it, nine wanted it to remain the same. Comments ranged from “Utility distribution engineers do not know how to address the screen as it is written now” to “The trouble is, a 10 MW [system] can represent a significant amount of generation depending upon the transmission or sub-transmission to which it is connected. This is particularly true in rural systems. The loss of 10 MW of generation could be significant and result in voltage stability problems. FERC and NERC [North American Electric Reliability Corporation] regulations of stability do not apply [to] voltage levels below 100 kV. Therefore, any change to increase the aggregate capacity above 10 MW should be, at a minimum, tied to system voltage.” We believe that this screen is vague and thus frequently misunderstood by SMEs, so it should be changed to address specific safety or reliability concerns.

Screen 2.2.1.3: *The existing screen is: “For interconnection of a proposed Small Generating Facility to the load side of spot network protectors, the proposed Small Generating Facility must utilize an inverter-based equipment package and, together with the aggregated other inverter-based generation, shall not exceed the smaller of 5% of a spot network’s maximum load or 50 kW.”*

The networks screen vote results were 21 for updating, 11 against, effectively meeting the two-thirds consensus threshold.

We believe this screen needs two updates. First, FERC SGIP screen 2.2.1.3 should expand its narrow focus on spot networks, which typically serve one large building, to also address area network interconnections⁶ (FERC Docket RM02-12-000, 2005) that may supply several city blocks. Second, the limit should be raised in accordance with new rules adopted at the state level. Specifically, the state of Connecticut drafted a rule on networks stating, “Total aggregate generation interconnected to an area network will be limited to 3% of the maximum network transformer connected kVA with the feeder supplying the largest number of network units out of service, or a maximum of 500 kW, whichever is less” (Connecticut, 2010). It should be noted that this Connecticut rule also defines some additional technical criteria, which cannot be overlooked, but does not change the significance of this 3% or 500 kW rule.

Additionally, Consolidated Edison of New York, Inc. (Con Ed), in an effort to reduce barriers to interconnection of customer-owned DG, announced that inverter-based systems sized between 25 kW and 200 kW may follow the expedited application process for interconnection to the utility’s distribution network systems as long as the inverter-based system has been certified and tested in accordance with UL 1741 (November 2005 revision) and the utility has approved the project accordingly. While the Con Ed networks in New York represent the majority of the area networks in the United States, they are not necessarily representative of all U.S. area networks.

⁶ Network system means an AC power distribution system in which customers are served from three-phase, four-wire low-voltage circuits supplied by two or more network transformers whose low-voltage terminals are connected to the low-voltage circuits through network protectors. The network system has more than two high-voltage primary feeders, with each primary feeder typically supplying multiple network transformers, depending on network size and design.

Furthermore, the IEEE 1547.6, “Recommended Practice for Interconnecting Distributed Resources with Electric Power Systems Distribution Secondary Networks,” had gone to ballot at the time of this writing (July 2010). When released, the results of this guideline should also be considered when deciding on a possible update to screen 2.2.1.3.

Screen 2.2.1.2 The existing screen is: “For interconnection of a proposed Small Generating Facility to a radial distribution circuit, the aggregated generation, including the Small Generating Facility, on the circuit shall not exceed 15% of the line section peak load as most recently measured at the substation. A line section is that portion of a Transmission Provider’s electric system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line.”

The votes to update this screen were split—18 in favor, 20 opposed. An SME’s comment in favor was, “I believe that the majority of the interconnections of (aggregate) gens sized between 15% to 30% of peak load will cause no additional issues, but there may be a few where genuine concerns should be addressed. The key is to have a simple supplemental review process with secondary screens to quickly address the question.” An SME concerned about the change wrote, “I think increasing the limit ultimately would be OK if a study focused on min/max loading ratios, time of day aspects, etc., that demonstrates the 15% number is predominantly too conservative an estimate of daytime low load conditions.”

More than half of the interconnected grid-tied PV systems installed in the United States are installed in California. As expected, some of the highest levels of grid-tied PV penetration are also in California. We were interested in responses from California-based SMEs, given their level of experience with a 15% threshold. Of the respondents with California DG interconnection experience, ten support updating the screen and seven do not. Of the ten SMEs supporting an update, nearly two-thirds voted to increase the limit to 30% of line section peak load, which is double the current limit.

The nearly even split in opinion among all the SMEs contrasts with the more favorable response from the California SMEs. Many of the SMEs who voted against raising the limit cited safe operations (islanding) as the issue. Low limits in the screen tend to burden the PV industry with the cost and time delay of system studies. On the other hand, setting the level higher than necessary increases risk and may lead to grid problems, inviting potential backlash that could damage any progress being made in adopting PV. However, raising the limit is vital for continued rapid growth in PV, so it is prudent to determine the appropriate limit. Many SMEs providing input—as well as authors of recent research reports—believe the safe limit is significantly higher than the current 15% limit in this screen. Therefore, we recommend that DOE or NREL develop a study to address the concerns identified by the SMEs and to determine the procedures and limits that will preserve safety and reliability without hampering PV development. One facet of the solution may be to treat inverter-based generators separately from other generators.

10 kW Inverter Process: “The procedure for evaluating an Interconnection Request for a certified inverter-based Small Generating Facility no larger than 10 kW that uses the section 2 screens. The application process uses an all-in-one document that includes a simplified Interconnection Request, simplified procedures, and a brief set of terms and conditions. See SGIP Attachment 5.”

The votes in favor of updating this screen were 21 votes for and 16 against. While these numbers do not reflect a two-thirds majority threshold, we felt that several SMEs who supported an update made strong arguments in favor of it and the

arguments made for keeping the existing screen were weaker. For example, one SME with a strong argument explained his support of an update like this, “I favor the increase to 25 kW because of the precedent (in New York, for example), the lack of issues that have arisen from sizes in this range, and most importantly, because the systems still have to pass the fast-track screens. This should adequately protect against systems being installed without proper scrutiny.” It should be noted that more than 75% of the SMEs who support increasing the size limit indicated they would support moving the limit to 25 kW or higher.

Even though 16 SMEs did not support updating the screen, their comments shed light on the fact that more dialogue is necessary before a final decision about updating this screen is made. We believe that many of the SMEs who voted against updating this screen may be convinced of the appropriateness of the update if there is an opportunity for open dialogue among SMEs about this screen. For example, one SME said, “Standards such as [Underwriters Laboratories] UL/IEEE/NEC [National Electrical Code] do not address multiple DR [distributed resources]. Twenty-five kW DR, in aggregate, could very quickly cause problems on distribution secondaries,” which suggests that this SME did not consider that to be eligible for the 10 kW Inverter Process a system must pass all 10 fast track screens.

Several states (New York and Connecticut, for example) recently adopted small generator interconnection procedures that have a 25 kW system size limit on the streamlined inverter process. Additionally, IREC’s model small generator interconnection procedures, which represent best practices, contain a 25 kW limit to its streamlined inverter process, referred to as the Level I process. These procedures were developed more recently than the FERC SGIP, thus allowing IREC to consider recent industry experience with significantly more distributed PV systems than during the development of the FERC procedures.

Considering the responses of the SMEs and the precedents set by the recent state and model small generator interconnection procedures, we believe there is considerable justification to increase the inverter process system size. Despite the lack of a two-thirds majority for updating the screen, but due to the positive responses from many of the SMEs, a lack of issues with systems this size, and the recent precedents set by state and model small generator interconnection procedures, we believe FERC and NARUC should facilitate additional dialogue on the issue and consider increasing the system size limit for the Inverter Process.

Other Screens

For the remaining screens, no consensus was reached by the SMEs. They were mixed about their support of updating those screens, and many mentioned serious concerns regarding both the current versions and the considered updates of these screens. We believe that the process to address issues and concerns in the remaining screens requires additional interactive discussion that is beyond the scope of this report.

Competitive Fairness

Recommendations related to competitive fairness are presented in the following section.