

**Question 2.6**

*Regarding voltage issues resulting from RES/DER integration, are there any actual cases where the reactive power control of an inverter is applied? Are there any evaluation or consideration dealing with prioritization, or the combination of various types of voltage control methods?*

*When trying to utilize the resources on the customer side, how should fairness between the resource owners be taken into account?*

**Response to Question 2.6:**

In the U.S., DER interconnection standards and rules such as IEEE Std. 1547-2018, California Rule 21, and Hawaii Rule 14h require reactive power control and other grid supportive capabilities from DER (also referred to as DER smart inverter functions). While these capabilities are being increasingly considered and applied, the utility practices on DER control functions and settings are still evolving and vary from state to state and utility to utility.

EPRI has conducted extensive research on the effective utilization of DER smart inverter functions and their coordination with existing distribution system voltage regulation equipment. Recent EPRI – NYSERDA research project has demonstrated that effective utilization of DER smart inverter functions or existing voltage regulation equipment alone can support integrating higher penetrations of DER. The research has further demonstrated that, when effectively coordinated jointly, smart inverter functions and voltage regulation equipment can support even higher DER penetrations. On the other hand, the research has also shown that DER smart inverter functions increase the complexity of distribution voltage and reactive power regulation. To address these complexities, EPRI has developed processes and tools for distribution utilities to select effective smart inverter functions and settings, and to coordinate them with existing voltage regulation equipment.

EPRI's prior research has shown that activating DER smart inverter functions may result in DER generation curtailment and increased DER inverter utilization. In particular, Volt-var and other DER reactive power functions can result in both curtailment and increased inverter utilization, and DER active power functions can result in generation curtailment. However, EPRI's prior research has indicated that the impacts are expected to be negligible to most DER provided that the DER voltages are maintained within the standard ranges. Nevertheless, it is recommended to identify potential outlier cases of DER customers who may be adversely impacted.

In the U.S., many DER interconnection standards and rules require certain capabilities from the DER. In such cases, the capabilities are considered as prerequisites for the DER interconnection. In some jurisdictions in the U.S., there has been discussion about compensating DER owners for the grid supportive capabilities the DER provides. EPRI's research has indicated that the adoption of DER smart inverter functions yields positive although limited impact on the utility rate payers. Hence, if the DER owners were compensated, the compensation may be limited.