Smart Inverter Frequently Asked Questions (FAQs)

What is an inverter? An inverter converts the direct current (DC) output of a photovoltaic (PV) solar panel or battery into a utility frequency alternating current (AC) that can be fed into an electrical grid.

How are Smart Inverters different? Smart Inverters have special functions adapted for use with a solar system or battery that includes, but not limited to, maximum power point tracking and anti-islanding protection.

Why are Smart Inverters important? Solar systems produce electricity that is interconnected to the electrical grid. If the production of that electricity was constant, that is the sun is always shining and the skies are always clear, the need for Smart Inverters would be diminished. However, that is not the case. Electricity generated from these can fluctuate significantly, which impacts voltage, frequency, and reactive power. In other words, it diminishes power quality to all customers on the grid.

What is PPL doing to address this issue? Throughout the U.S, utilities with high solar penetration rates have upgraded their interconnection standards. In particular, the California PUC mandates that smart inverters comply with the latest industry standards: IEEE 1547 and UL 1741. In a similar way, the Pennsylvania Alternative Energy Portfolio Standards (AEPS) require smart inverters to comply with these standards, as amended or approved.

What are IEEE 1547 and UL 1741 Standards? IEEE 1547 requires Distributed Generation devices to disconnect when the grid is experiencing stability issues. The new UL 1741 Supplement A (SA), which was adopted in September 2016, specifies the test methods needed to build the foundation enabling DG devices to stay online and adapt their output and overall behavior to stabilize the grid during abnormal operation rather than simply disconnecting.

How do Smart Inverters improve reliability? Smart Inverters have the capability of "riding through" minor disturbances to frequency or voltage. These functions are called **under/over frequency ride-through** and **under/over voltage ride-through.** They direct the distributed system to stay online and respond accordingly to relatively short-term, minor events.

Can Smart Inverters also improve stability? Smart inverters can help the grid regain stability during an under- or over-voltage event is by controlling the real and reactive power output of the solar system. Smart inverters can assist by changing the level of real power output from the system by controlling the rate at which real power is fed onto the grid or by injecting or absorbing reactive power into or from the grid.

Can Smart Inverters help prevent the reoccurrence of a grid disturbance? If many distributed generation systems come online simultaneously, another grid disturbance may be triggered. To prevent this from happening, the timing of reconnection of solar system to the distribution system can be staggered.