

## Distributed Solar PV and grid voltage

**Voltage as a Service (VAAS)**<sup>TM</sup> is an energy-saving service solution for regulating and optimizing the voltage supplied to electrical equipment to the optimal level for efficient operation. The purpose of VAAS is to reduce energy consumption, lower electricity bills, and decrease carbon emissions by ensuring that electrical devices operate at their most efficient voltage level.

### Enhancing Solar PV performance

**Voltage as a Service (VAAS)** can enhance the performance of Solar PV systems by stabilizing voltage levels, improving efficiency, extends the component lifespan, and supports better grid integration.

This results in increased energy production, reduced maintenance costs, and overall improved financial returns for solar energy projects.

### Effects of distributed Solar PV on grid supply voltages

Grid supply voltages can be affected by distributed solar photovoltaic (PV) systems.

Distributed solar PV systems can introduce voltage fluctuations and impact the stability of the voltage on the local electrical grid.

These affects are summarised in the following table.

| Affect                               | Description   |
|--------------------------------------|---|
| <b>Voltage Rise</b>                  | When solar PV systems generate more electricity than is consumed locally, the excess power can cause the voltage to rise. This is particularly noticeable in areas with high solar penetration and low local electricity consumption.     |
| <b>Voltage Regulation</b>            | The integration of large numbers of small-scale solar PV systems can challenge the grid's ability to regulate voltage. Traditional voltage regulation equipment may not be designed to handle the distributed nature of solar generation. |
| <b>Reverse Power Flow</b>            | Solar PV systems can cause reverse power flow, where power flows from the consumer back to the grid. This can affect the operation of transformers and voltage control devices designed for unidirectional power flow.                    |
| <b>Load and Generation Imbalance</b> | Fluctuations in solar power generation due to changes in sunlight can lead to imbalances between load and generation, affecting voltage stability.  |
| <b>Grid Stability</b>                | The variability and intermittency of solar power can introduce challenges in maintaining grid stability and voltage levels, especially in grids that are not designed for high levels of distributed generation.                          |

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