



# Hosting Capacity

## Our Services

*Our Distribution team is comprised of industry experts with extensive utility experience. We have a strong customer focus to ensure that our clients' objectives are fully and effectively met. Our service offerings are flexible so that they can be tailored to meet specific client objectives.*

### Growth of Distributed Generation

The growth of solar photovoltaic and wind distributed generation is changing how utilities operate and plan their distribution grids. The transition from large central station plants to distributed generation plants have affected both transmission and distribution grids. The impact is greater on distribution grids since most of them were designed and built as radial systems where power flows in one direction to loads. With distributed generation the power flow is bi-directional up to the point of exporting energy to the transmission at certain times.

However, distributed generation falls under a broader category of distributed energy resources (DER) which includes grid-connected energy storage, electric vehicles, and microgrids. In the case of microgrids, for example, all the above distributed energy resources could be connected to the electric grid and presenting challenges for the grid operator to accommodate all of them without causing adverse impacts.

### Location Dependent

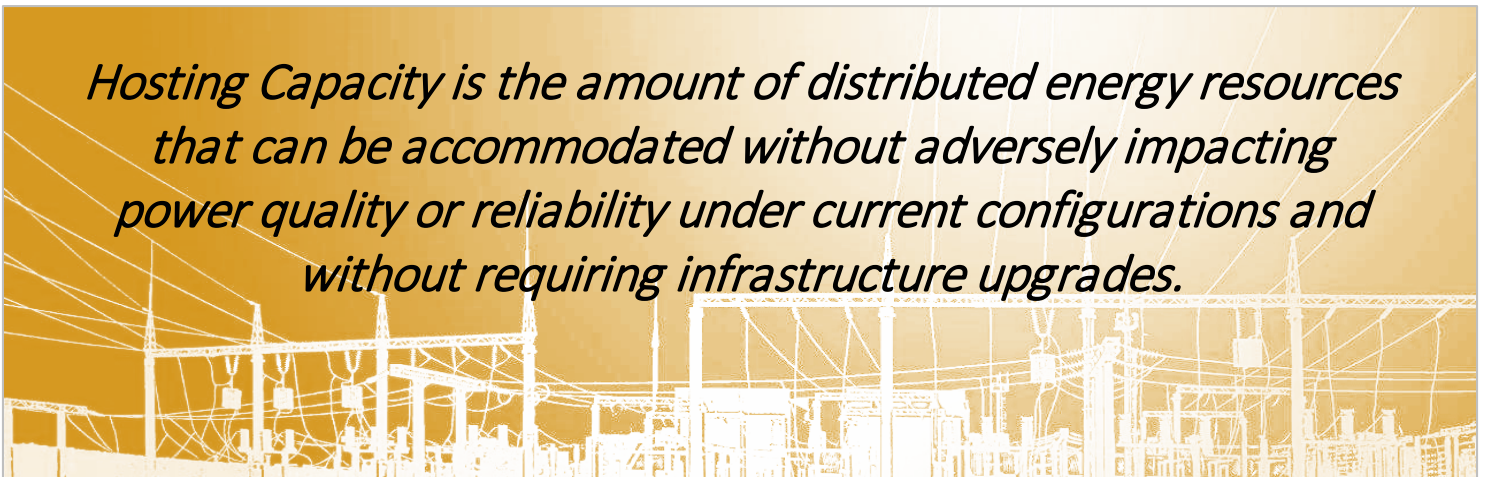
As with any distribution planning study the location of any new generation resource is important as the power flow is dependent on the source, the grid infrastructure, and other planned additions or modifications to the feeder. Each feeder has its own characteristics that must be considered such as minimum and maximum loads, power factor, the presence of voltage control devices (voltage regulators or capacitor banks), and conductor type.

The physical connection to the distribution grid creates impacts that vary based on location. Hosting capacity evaluate the impacts of DER at varying line sections and nodes on the distribution feeder.

### Time Varying

Traditionally, distribution planners focus on the peak load conditions for their annual planning criteria, but due to the intermittency associated with DER, planning studies must look at maximum and minimum load conditions. Loading affects voltage conditions and if DER generation is variable by nature, it cause the voltage to vary as well. The planner must study multiple generation and load conditions to account for all potential impacts.

*Hosting Capacity is the amount of distributed energy resources that can be accommodated without adversely impacting power quality or reliability under current configurations and without requiring infrastructure upgrades.*





## Hosting Capacity

Also known as Integration Capacity Analysis (ICA), can be performed on most major power flow platforms. Many utilities require customization for their specific needs which can be done using scripting tools and common coding languages. The results are often transferred to geographic databases and illustrated in heat maps. This coding should be done by someone with deep knowledge and experience like Quanta Technology.

As voltage varies, it may cause “flicker” problems that must be addresses. In addition, the variation of load and generation, depending upon time of day and environmental conditions, may cause reverse power flow toward the source substation. This reverse power flow may not be desirable and may have impacts on the substation transformer load tap changer and any line voltage regulators. There may be issues related to reverse power flow at the feeder head or back onto transmission.

### Feeder Specific

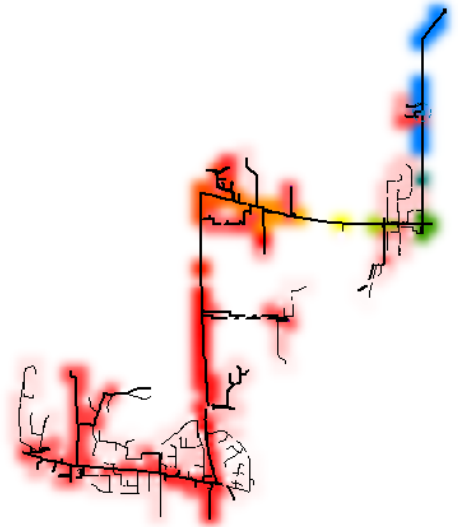
In distribution, no two feeders are identical, so each has its own operating characteristics affecting its load carrying capability, manifested in thermal limits for conductors and line devices. Traditionally, the hosting capacity is determined feeder by feeder, requiring a power flow analysis for each.

We conduct assessment of line components (conductor, insulators, hardware) and structures using various inspection technologies and practices, as well as quantitative analysis of maintenance and failure data. Our capabilities included assessment of structure deterioration from corrosion and evaluation of structural integrity. Our transmission line evaluation also includes assessment of UG transmission, including pipe-type systems.

### Protection

DER has the potential to impact the protection coordination scheme for distribution feeders. Studies should address mis-operations, sympathetic trips and potential reduction in sensitivity.

Most major power flow software vendors offer hosting capacity modules to facilitate analysis. Often, distribution planners need to enhance the simulations using scripting tools such as Python. Quanta Technology is a leader in this field and has evaluated thousands of feeders.



### About Quanta Technology

Quanta Technology is an independent technology, consulting, and testing company providing business and technical expertise, along with advanced methodologies and processes, to utilities and others in the power and energy industries. Our mission is to provide unparalleled value to our clients in every engagement across the value chain by using advanced software and hardware, laboratories, and custom tools for a holistic approach to practical service and the most insightful thought leadership in the industry.

#### For Additional Information Contact:

U.S. Northeast

**Mike Longrie:** MLongrie@Quanta-Technology.com

U.S. South/Southeast

**Diana Prkacin:** DPrkacin@Quanta-Technology.com

U.S. Central

**Evan Estes:** EEstes@Quanta-Technology.com

U.S. West:

**Reza Nasri:** RNasri@Quanta-Technology.com

International

**David Elizondo:** DELizondo@Quanta-Technology.com

## Smart Solutions Practical Results

All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them.



**QUANTA  
TECHNOLOGY**