Holistic Approach for Distributed Generation, Demand Response & Dynamic Pricing
by Jeremy Laundergan, Director, Utility Services Consulting, EnerNex

Objective
Foster conversation on a holistic approach to develop a systems view of electricity pricing, customer programs and increasing amounts of distributed generation.

Concept
In order to understand the impact of different technologies, programs, policies and programs, we separate components of a system into different parts and quantify them separately. This simplification has been the tendency when discussing different aspects of grid modernization and technology adoption including:

- Distributed Generation;
- Demand Response (DR); and
- Dynamic Pricing.

In actual application, these components operate concurrently and can complement or contradict each other’s contribution in a variety of ways:

- Photovoltaic (PV) distributed generation for end use customers may be more attractive with dynamic pricing like Time of Use (TOU), Peak Time Rebate (PTR), Critical Peak Pricing (CPP) and Real Time Pricing (RTP)
- The intermittency of PV generation can be partially mitigated by the utilization of DR where discretionary usage is curtailed with lower solar output or shifted to align with more abundant solar yield.
- CPP can be called on a hot day and decrease the overall peak demand, but the PV generation may exceed expectations resulting in an overabundance of energy.

The developing concept of Transactive Energy assumes that these and other components interoperate to facilitate informed decisions for the generation and consumption of electricity. However, to reach the long term goal envisioned by Transactive Energy to optimize the contributions from each component we must understand that each discrete element operates within a much larger system.

Some of these variables, such as customer demand, can and do respond to information such as price signals. Others are less responsive such as PV output which is directly related to cloud cover and time of year. Therefore, determining which aspects of the system are variable and determining whether the variability can be controlled is necessary in order for the controllable attributes to respond to the non-responsive elements. This requires a holistic systems approach to understanding the complex variables.