

Transactive Control: A Novel Technology for Smart Grids

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The 21st century is witnessing a prodigious change in energy landscape with the arrival of renewable sources such as wind and solar, global concerns of sustainability and greenhouse gas emissions, and dwindling resources of fossil fuels. The obvious advantages of reduced operational costs and emissions, obtainable with renewables such as off-shore wind-farms and solar-panels on individual buildings, are accompanied with the challenges of intermittency and distributed availability. The idea behind a Smart Grid is the creation of a dynamic, cyber-physical infrastructure that meets these challenges via a flexible, intelligent, and networked grid that plans, controls, and delivers power to meet demand over an entire region.

Solutions already exist for many individual challenges facing the adoption of smart grid technology, yet full realization still requires a vision for dynamic control with coordination of numerous processes and constituents across the spectrum of energy activities. A central component in realizing this vision is Transactive Control, an architecture that enables efficient participation of various heterogeneous stakeholders in the process including the renewable energy producers, demand response constituents, and aggregators while ensuring reliable power delivery. In this talk, various scenarios that exemplify the role of transactive control, the associated research challenges, and recent illustrations will be presented.