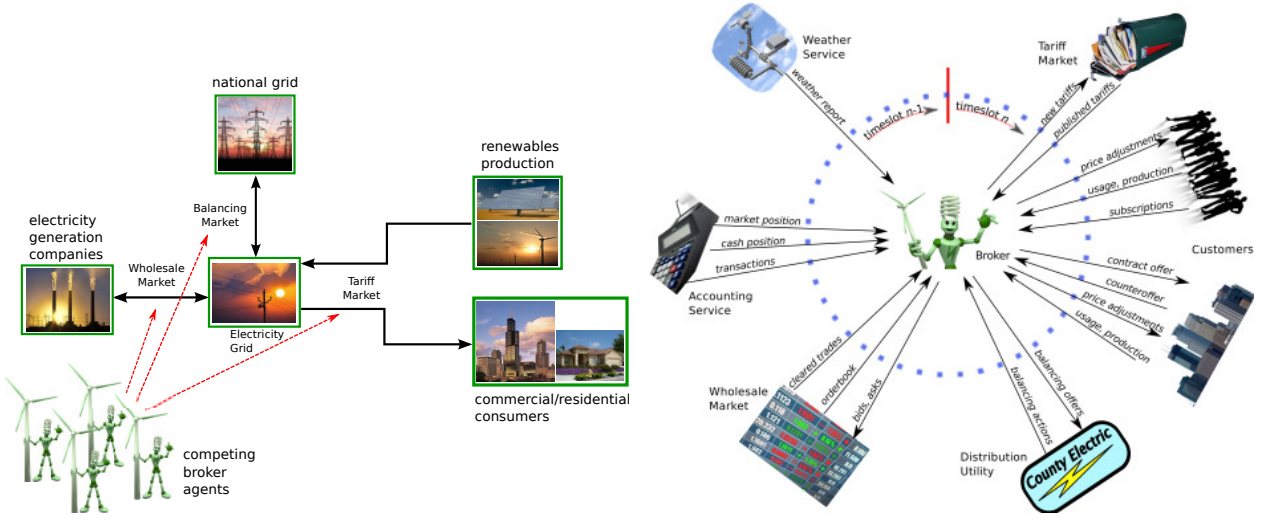
Energy Trading Agents - Daniel Urieli and Peter Stone [urieli,pstone]@cs.utexas.edu

Sustainable energy systems of the future will have to include a robust solution to a major challenge presented by many of the renewable energy resources (wind, solar, tidal, etc.): these resources do not produce power on demand. As a result, there is a need for efficient financial incentives that motivate consumers to shift consumption to times when renewable energy is available. Governments around the world are taking action to re-engineer their electricity grid into a smart-grid with supporting retail market infrastructure. However, the California energy crisis of 2000 and the east-coast blackout of 2003 demonstrated some of the risks presented by flawed market designs and unstable electricity grids.

UT Austin Learning Agents Research Group

The Power Trading Agent Competition (Power TAC) is a low-risk platform for modeling and testing retail power market designs and related automation technologies. It simulates a future smart grid environment with renewable energy production, smart metering, state-of-the-art autonomous agents acting on behalf of customers and retailers, and realistic market designs modeled after FERC, NordPool, and the Texas energy market, run by ERCOT.



Power TAC game-structure (Left), broker actions and information (right)

In Power TAC, autonomous broker agents (also called “energy aggregators”) compete with each other to maximize profits through energy trading in three different markets: a tariff market, a wholesale market and a balancing market. Our team, TacTex, won first place in the Power TAC 2013 finals, held in Bellevue, WA, USA. Power TAC should give insights regarding (1) computational techniques needed for designing energy trading brokers (2) the overall impact on the smart grid’s power flow and supply-demand balance in the presence of such brokers. A high-level goal of this research is providing concrete insights into using financial incentives for affecting consumption/production behaviors in the smart-grid.