**Goal**: Efficiently and equitably integrate distributed solar generation (DSG) onto the TVA grid

**Objective**: Design, estimate, and implement an agent-based computational economic (ACE) model of grid evolution in response to DSG diffusion.

**Advantages and Innovation**:  
1. ACE allows us to relax restrictive assumptions about the behavior of grid stakeholders (e.g., sunk cost fallacy, representative agent, rational economic behavior) and incorporate insights from behavioral economics and social psychology.  
2. ACE allows us to investigate distributional concerns whereby the cost and benefits of increased penetration of DSG fall on different segments of the population.

**Website**: [https://abm-distributed-solar.utk.edu/home/](https://abm-distributed-solar.utk.edu/home/)
Cost functions, ramping restrictions, and emissions for each generator

Create transmission network that accounts for capacity, reactance, and resistance

Electricity demand, retail prices, and probability of DSG adoption in each customer service district
Percent of residential population that adopts DSG

WTP for solar ranges from $89 (Huntsville, AL) to $1,299 (Cleveland, TN) (Bostick et al. 2021)
Retail prices fall slightly in all areas
Ongoing simulation experiments

1. Coal-fired power plant retirements and utility-scale renewable investments
   • Estimated shutdown costs and retirement times for remaining coal units (Davis et al. 2020)
   • DSG crowds out utility-scale solar (Roberson et al. 2021)

2. Introduction of two solar incentive programs not available in TVA area (Xu et al. 2021)
   • low-income assistance programs have helped close the gap between low- and high-income solar adoption
   • net metering associated with an increase in the gap between low- and high-income solar adoption
Project Team

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