

**2010 AIChE Spring Meeting and 6th Global Congress on Process Safety, March
21-25, 2010, San Antonio, Texas**

Title: Modeling the U.S. Natural Gas Pipeline Network in the National Infrastructure Simulation and Analysis Center (NISAC) Agent-Based Laboratory for Economics™ (N-ABLE™)

Authors: Greg E. Mackey, Mark A. Ehlen, and P. Sue Downes

Abstract: Natural gas is an important component in chemical supply chains as it is a necessary feedstock to many chemical production processes. This paper describes how Sandia National Laboratories (Sandia) implements a model of the U.S. natural gas market and pipeline network within the National Infrastructure Simulation and Analysis Center (NISAC) Agent-Based Laboratory for Economics™ (N-ABLE™). In this case, N-ABLE™ is used to simulate natural gas flows from suppliers to consumers, particularly during disruptive events such as hurricanes or earthquakes. The U.S. natural gas market is represented as a single natural gas marketer that brokers transactions between suppliers and consumers and enforces capacity constraints on the pipeline network using a maximum flow algorithm. Explicitly modeling the interactions between markets and flows allows Sandia to compare how normal conditions and disruptive events affect the supply, demand, and availability of natural gas. The paper concludes with an example disruption scenario.