Sensitivity Analysis & Calibration

The singular sensitivity analyses were performed using two approaches to assess the potential risks: Tornado Plot (Fig. 4) and a triangular distribution to develop the probability distribution plot (Fig. 5).

Figure 4. Tornado Plot, 50% increase & decrease in key parameters

Figure 5. Probability Distribution of Initial Unproven Reserve (top), Desired Reserve to Production Ratio (bottom) parameters using Latin Hypercube Sampling

Preliminary Results

The simulated proven reserves have close correspondence to U.S. Energy Information Administration (EIA) historical estimates of NG proven reserves, which is reflective model dynamics matching U.S. NG exploration market (Fig. 6).

Conventional Gas

Takeaway: Good model matching to historical gas proven reserves

Shale Gas

Takeaway: Recent growth captured by model

Coalbed Methane

Takeaway: Recent growth & decline captured by model’s behavior

Figure 6. Simulated & EIA Historical Proven NG Reserves

Takeaway Messages and Future Research

- Model is sensitive to initial Unproven Reserves and Desired usage growth constant (in the exponential growth function)
- Influence of technology is important, to research further
- Future modeling will look at different policy scenarios

Key References:
- SBT 2013, “The Future of Natural Gas.”