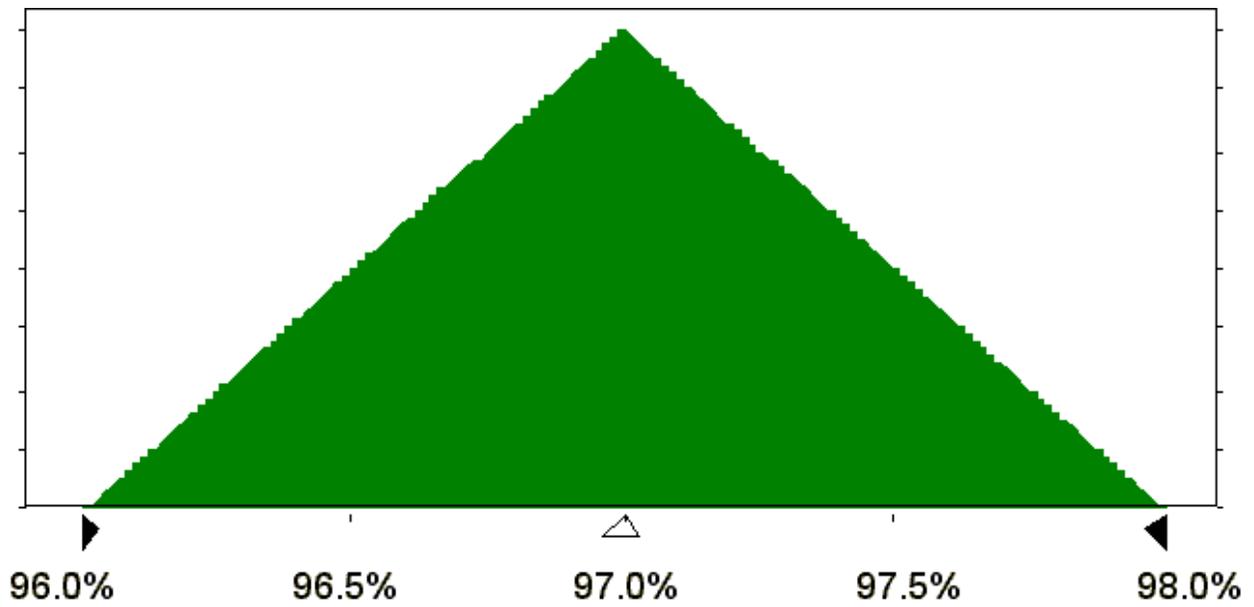
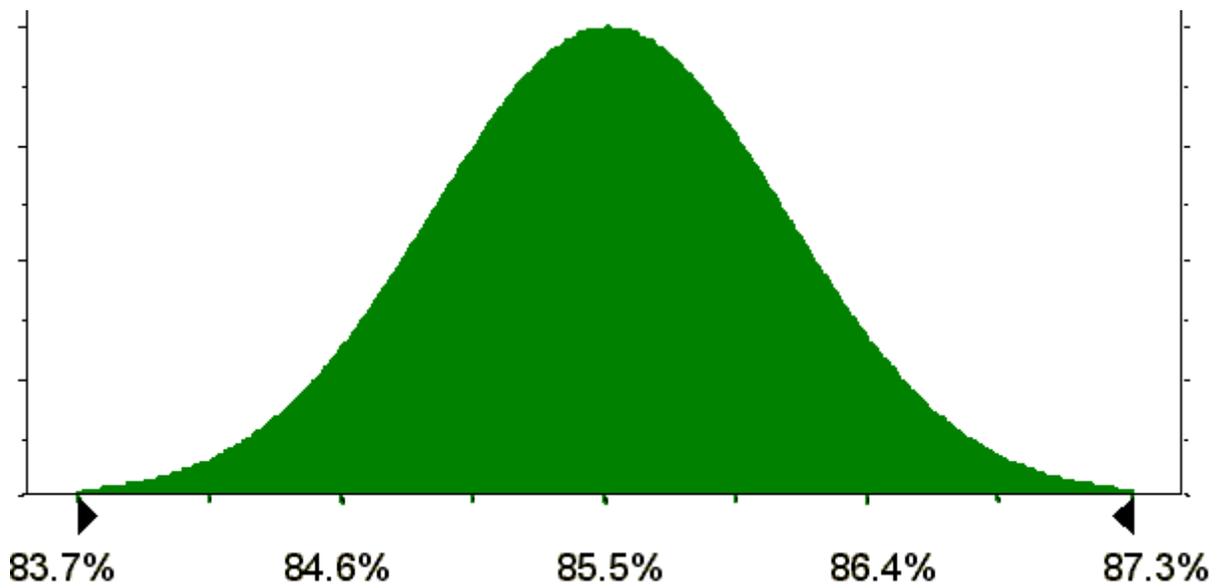


**Appendix A: Probability Distribution Functions for Key  
Well-to-Tank Input Parameters**



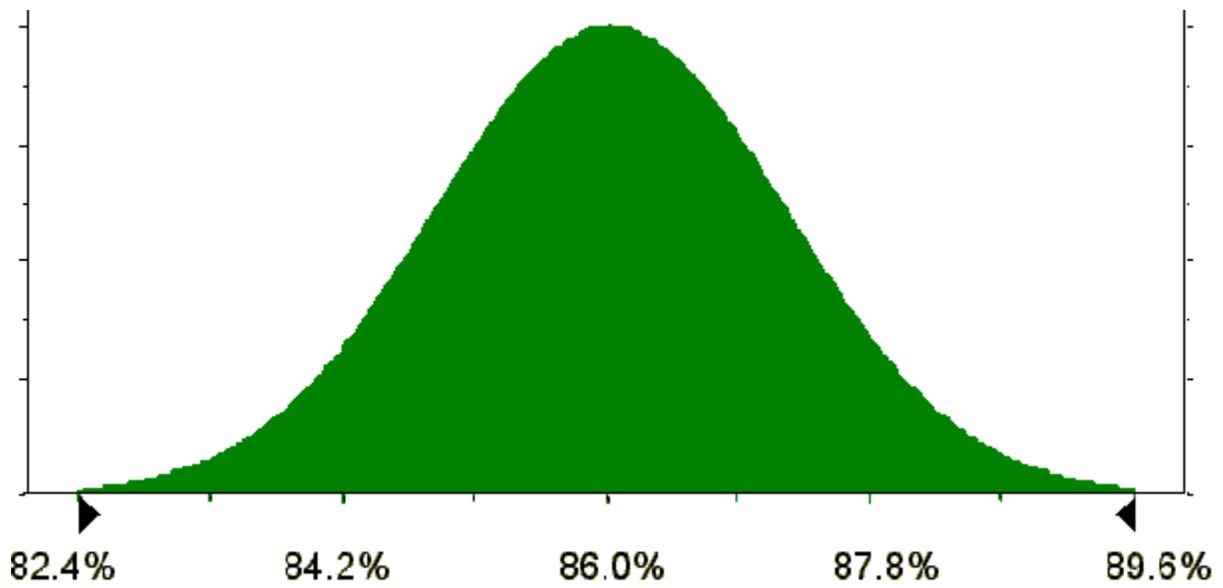


(a) Petroleum Recovery Efficiency

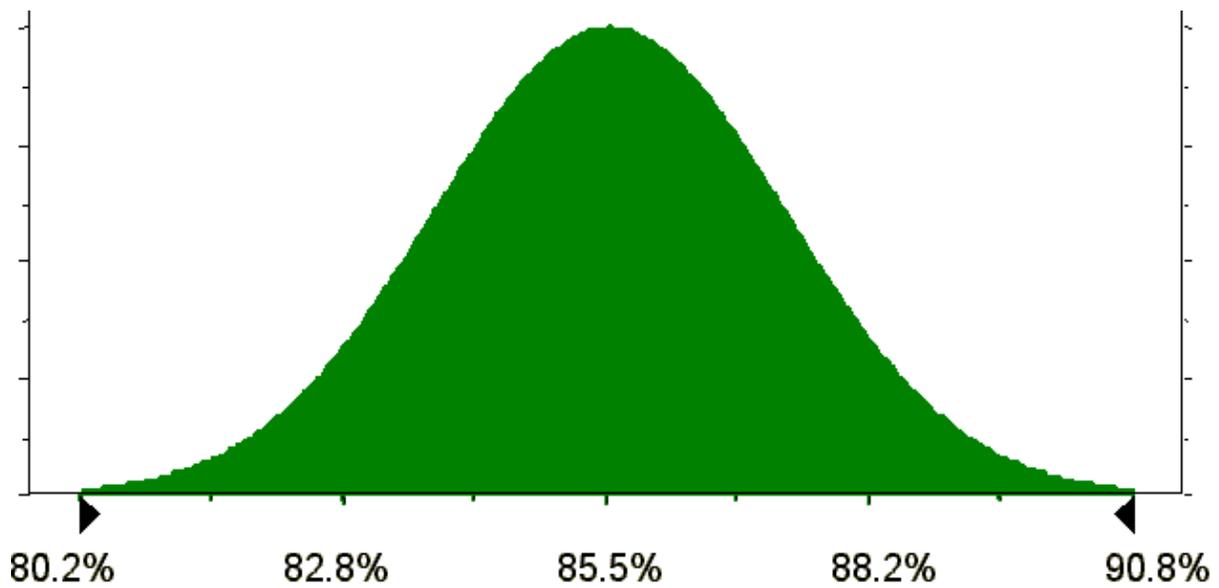


(b) Petroleum Refining Efficiency: 340 ppm S Conventional Gasoline

Figure A1 Probability Distribution Functions for Energy Efficiencies of Petroleum Recovery and Refining

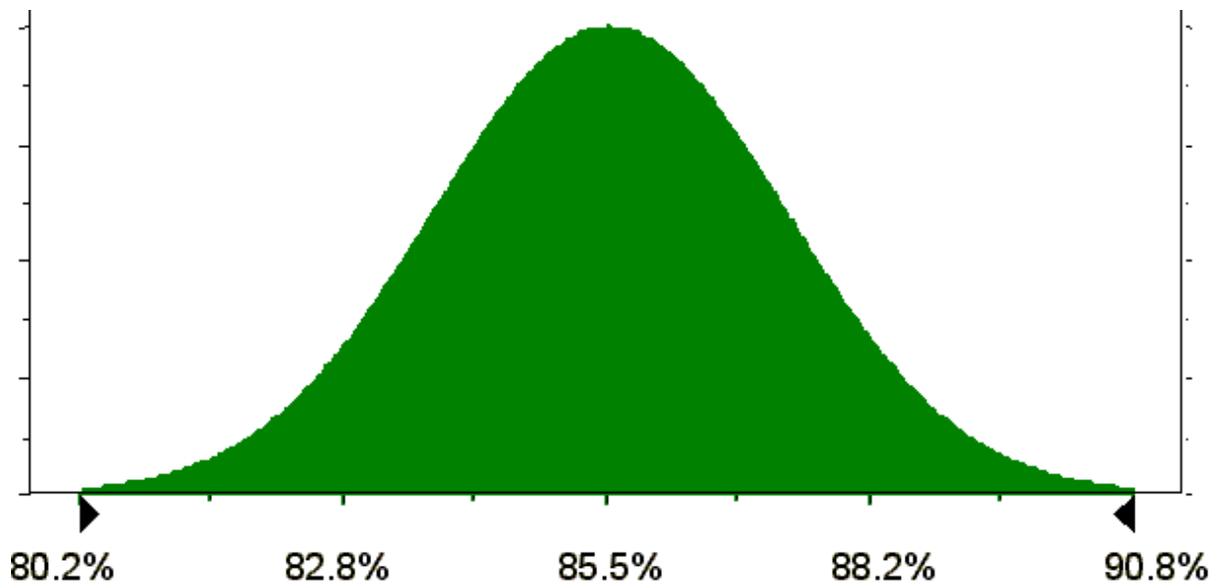


(c) Petroleum Refining Efficiency: 150 ppm S RFG with MTBE: GBS

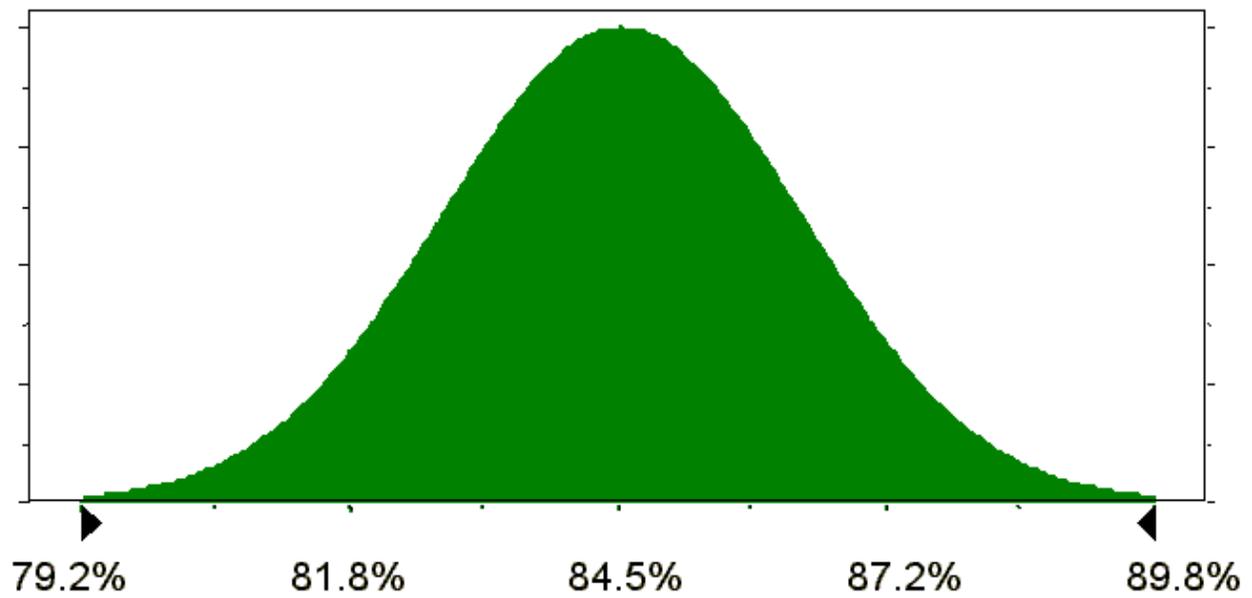


(d) Petroleum Refining Efficiency: 5-30 ppm S RFG with MTBE: GBS

Figure A1 (Cont.)

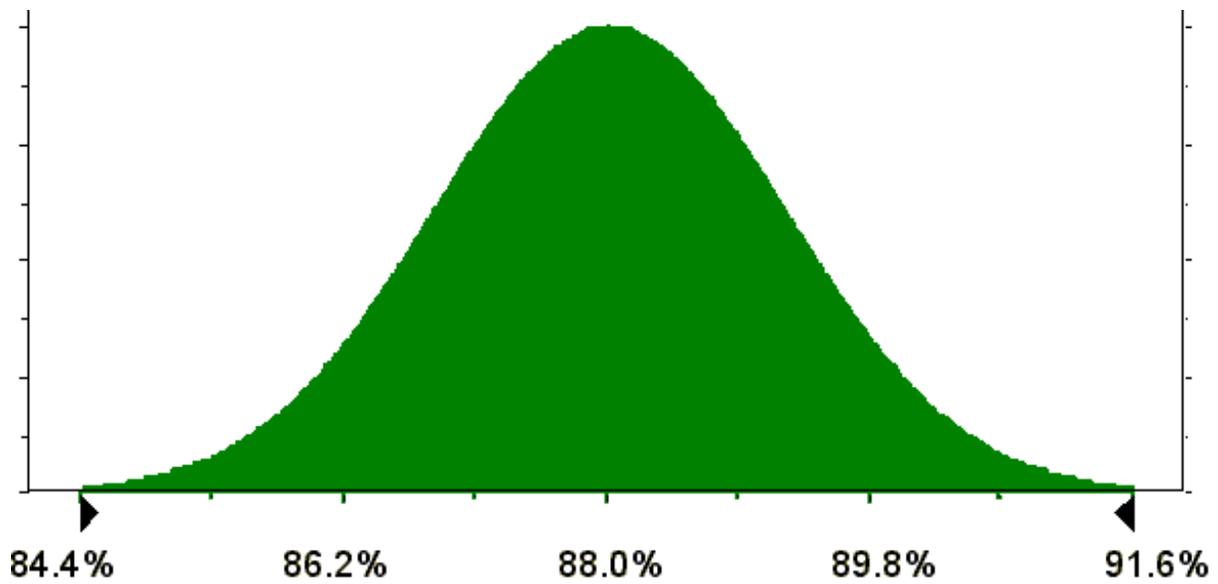


(e) Petroleum Refining Efficiency: 5-30 ppm S RFG with EtOH: GBS

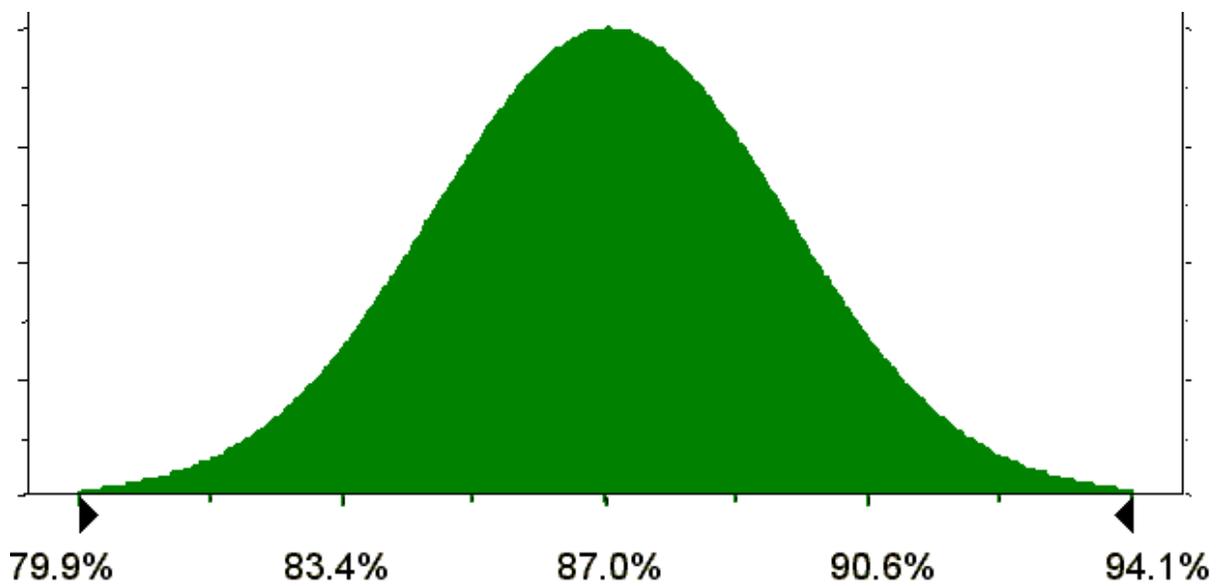


(f) Petroleum Refining Efficiency: 5-30 ppm S RFG with No Oxygenate

Figure A1 (Cont.)

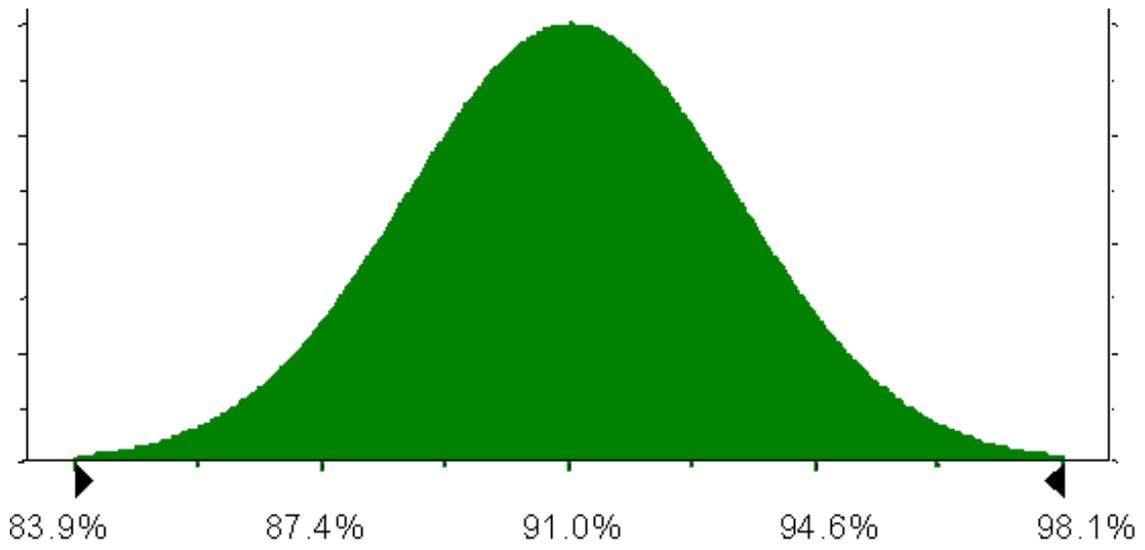


(g) Petroleum Refining Efficiency: 120–350 ppm S Diesel



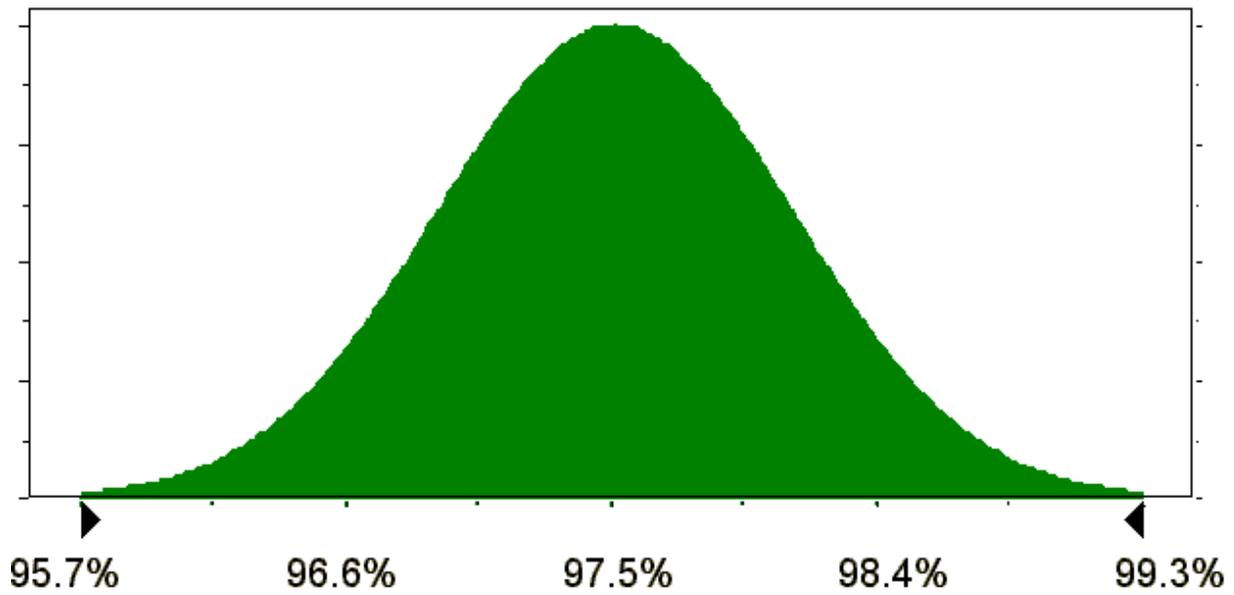
(h) Petroleum Refining Efficiency: 5–30 ppm S Diesel

Figure A1 (Cont.)

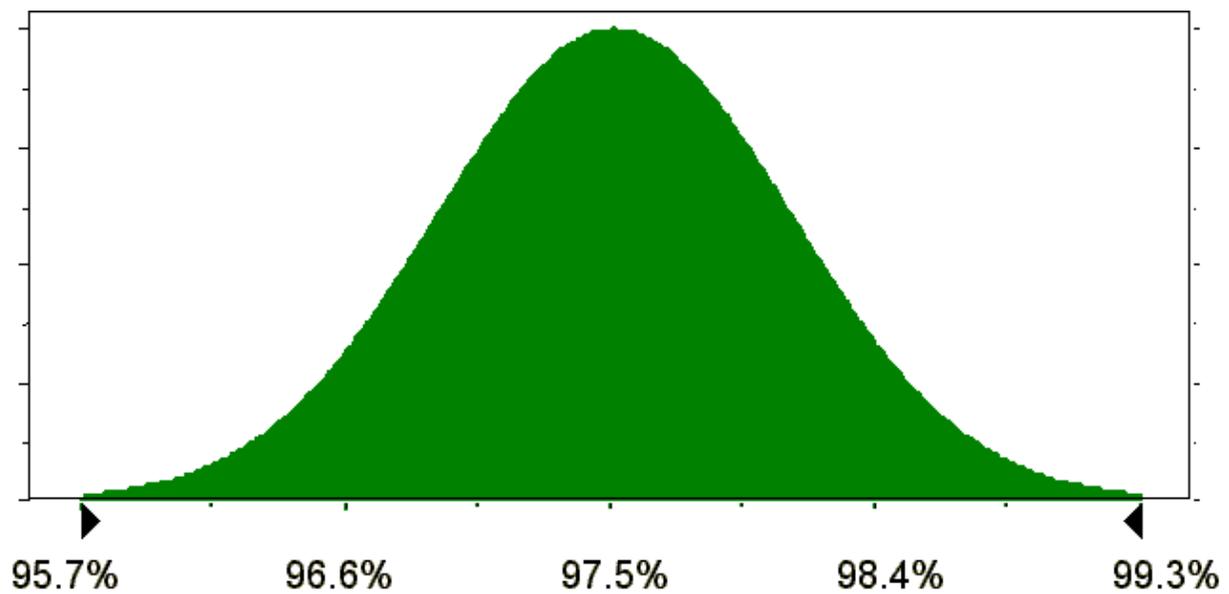


(i) Petroleum Refining Efficiency: 5 ppm S Crude Naphtha

Figure A1 (Cont.)

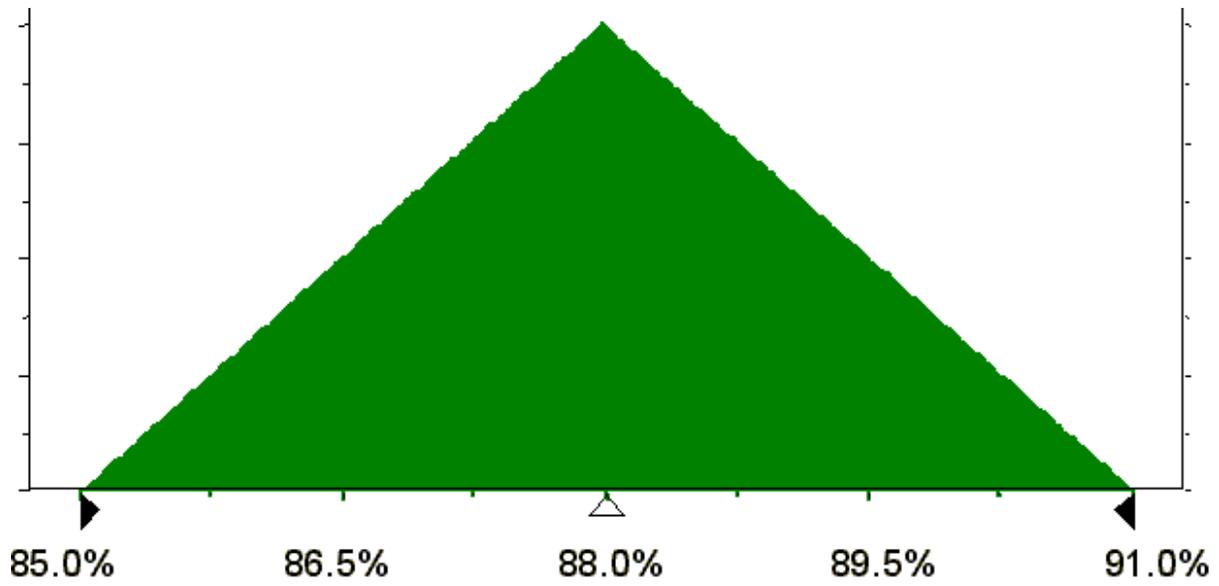


(a) NG Recovery Efficiency: NA NG, NNA NG, NNA FG

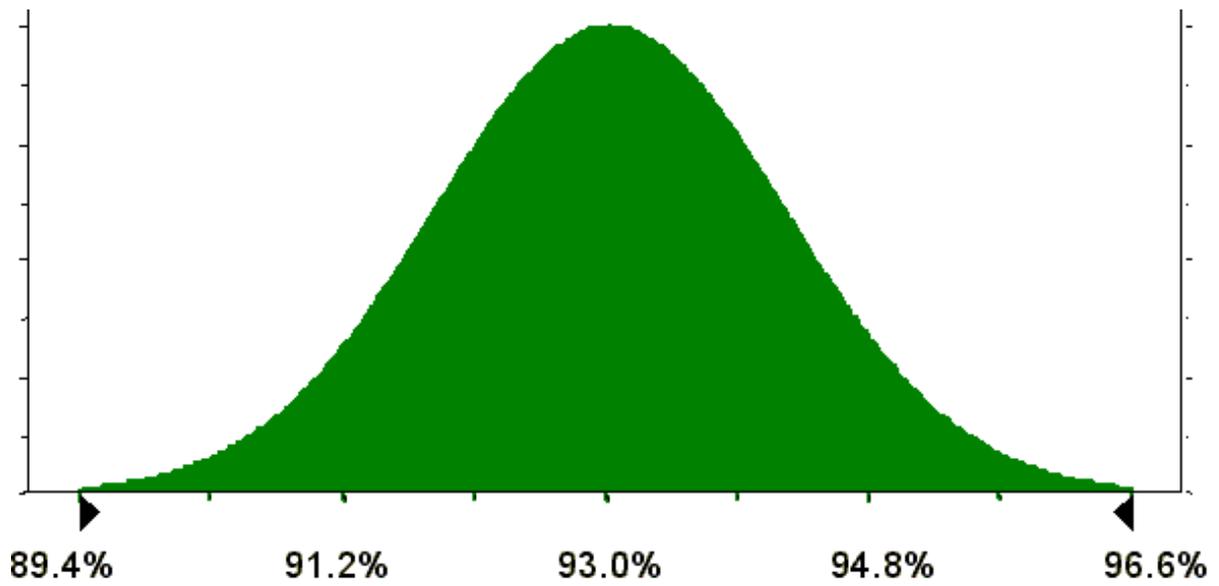


(b) NG Processing Efficiency: NA NG, NNA NG, NNA FG

Figure A2 Probability Distribution Functions for Energy Efficiencies of Natural-Gas-Based Pathway Activities

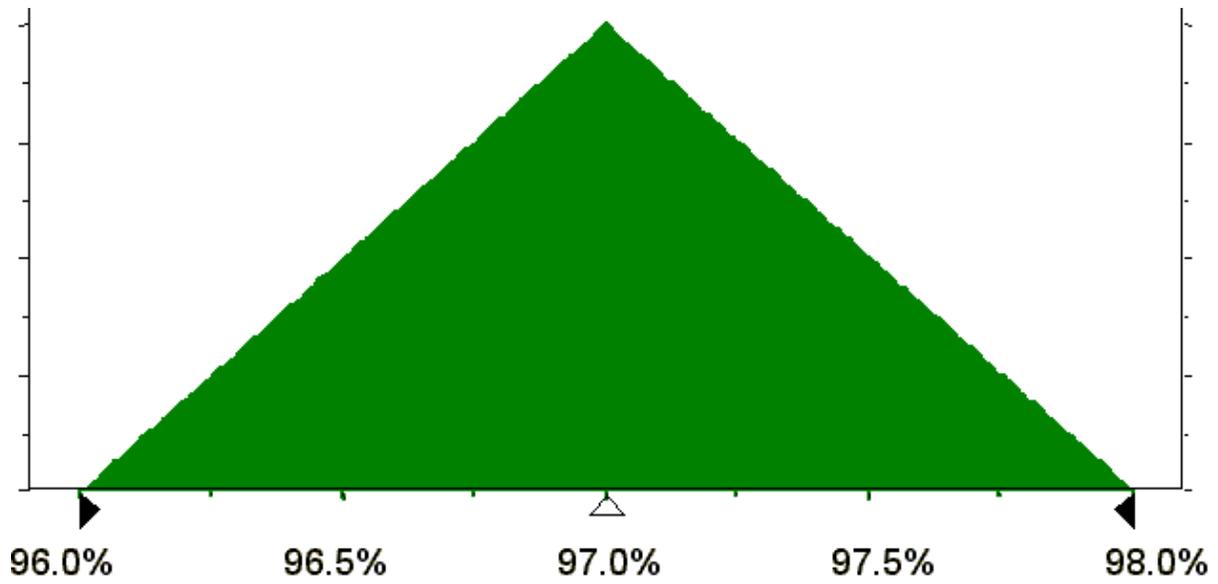


(c) LNG Production Efficiency: from NG and FG

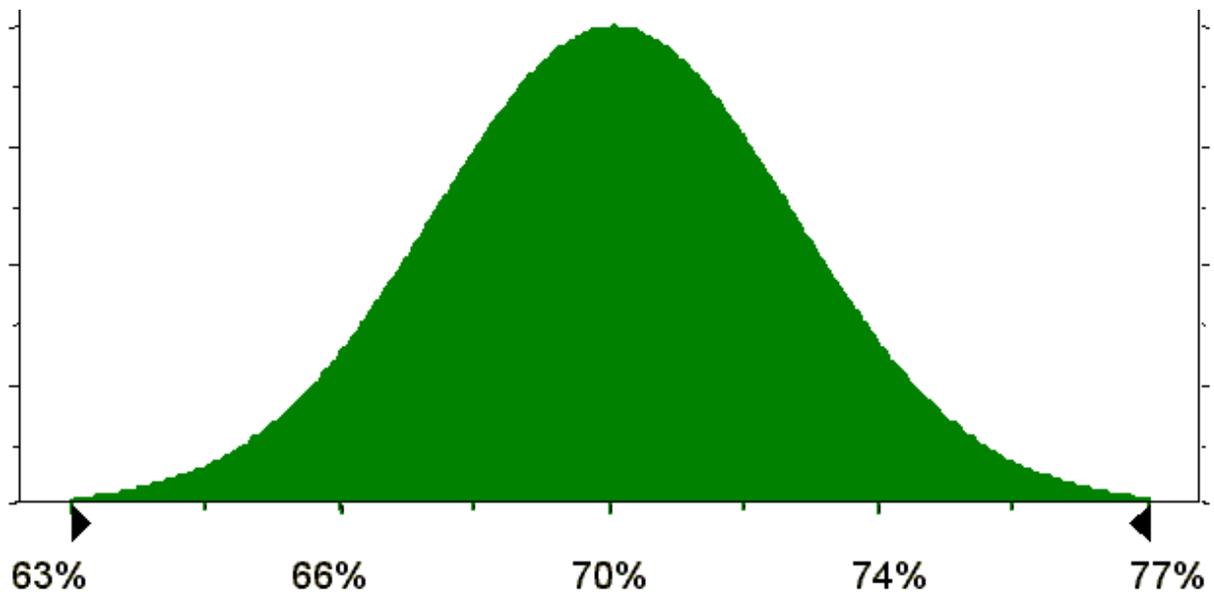


(d) NG Compression Efficiency: NG Compressor

Figure A2 (Cont.)

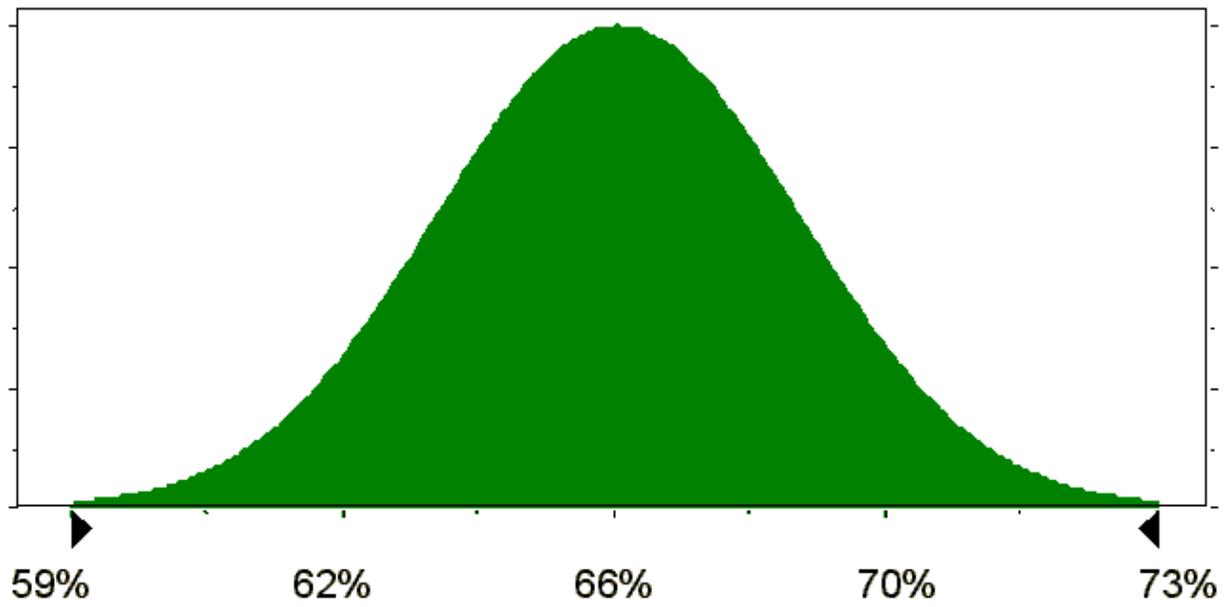


(e) NG Compression Efficiency: Electric Compressor

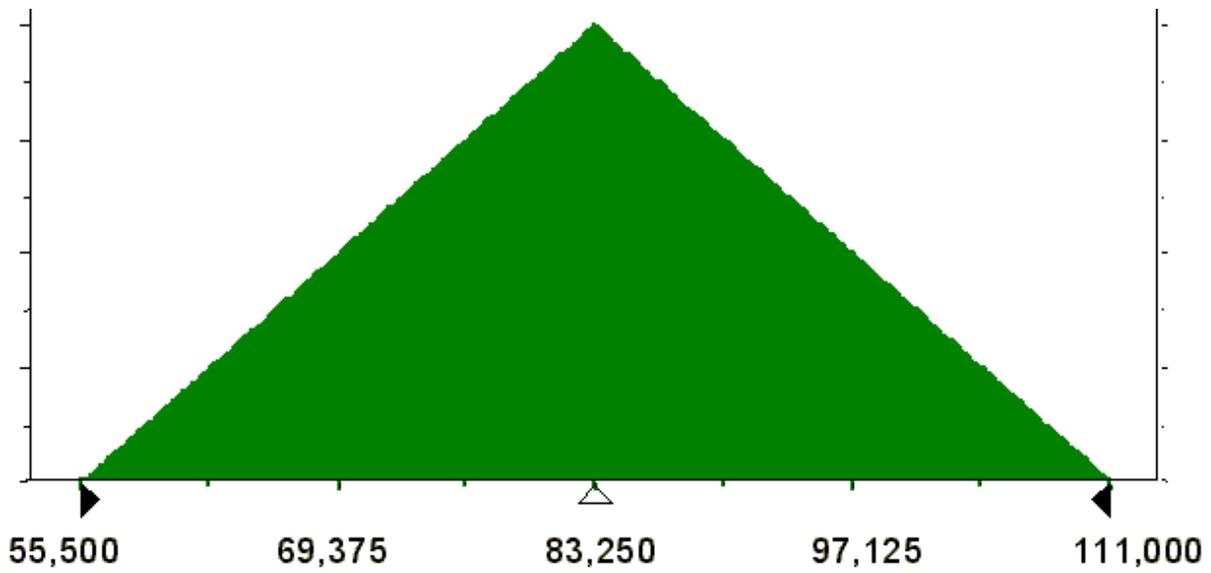


(f) MeOH Production Efficiency: with No Steam Production

Figure A2 (Cont.)

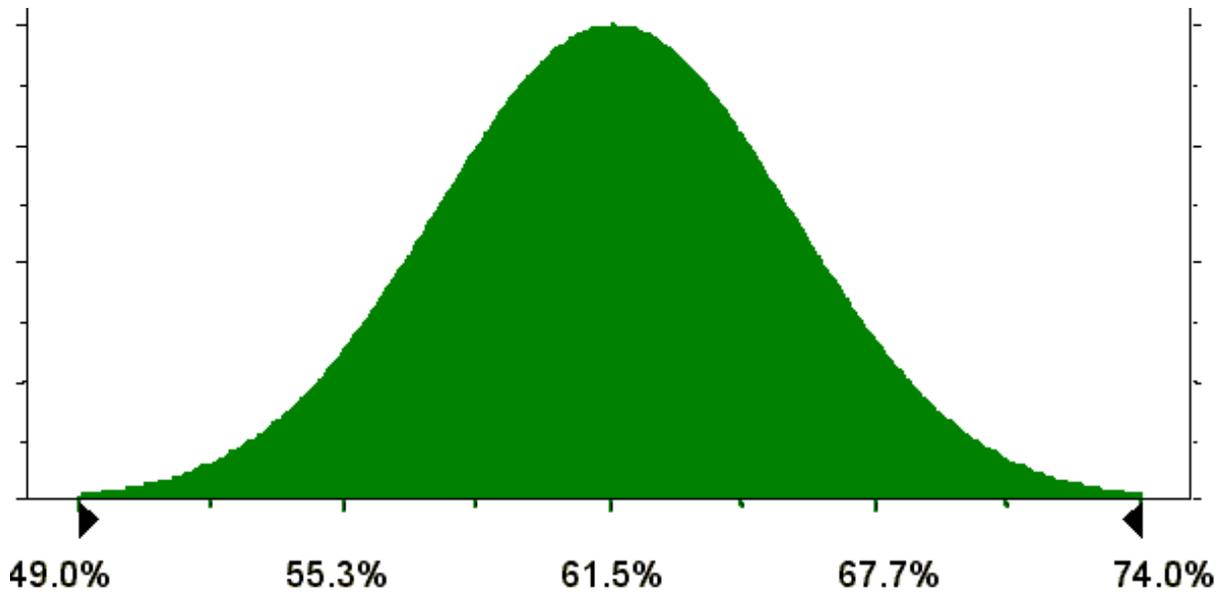


(g) MeOH Production Efficiency: with Steam Production

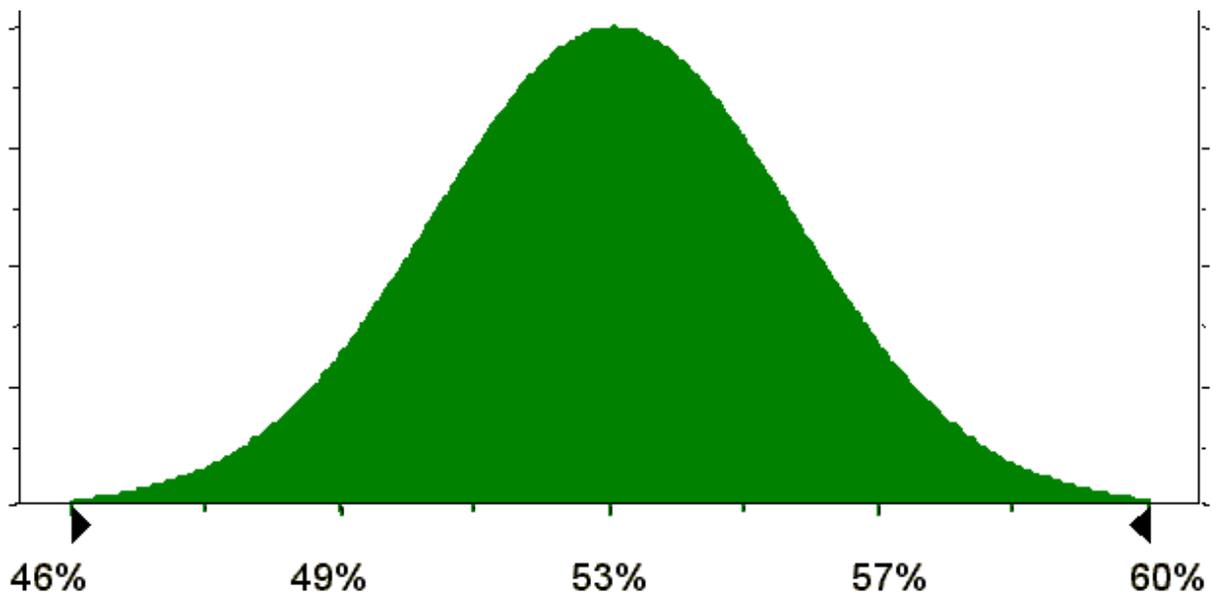


(h) MeOH Production Steam Credit

Figure A2 (Cont.)

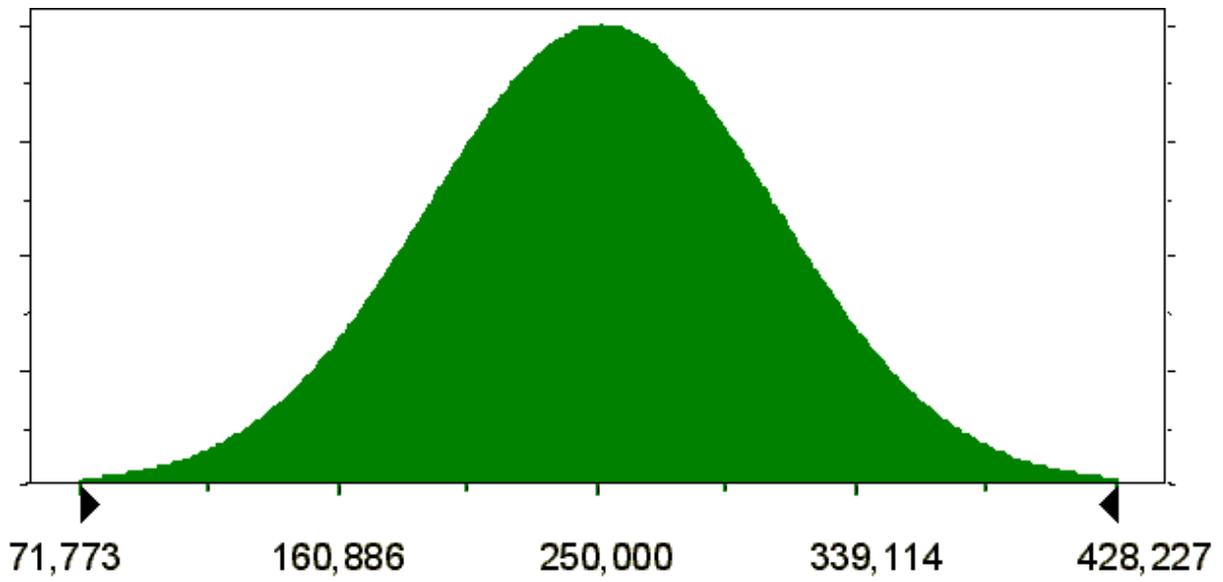


(i) FT Diesel and Naphtha Production Efficiency: with No Steam Production

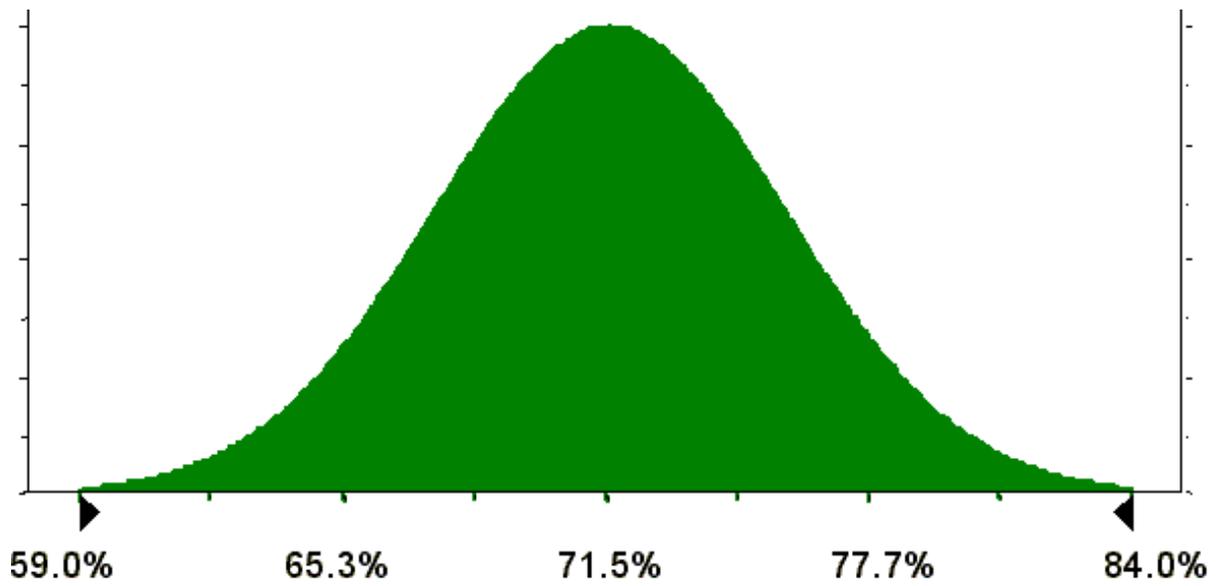


(j) FT Diesel and Naphtha Production Efficiency: with Steam Production

Figure A2 (Cont.)

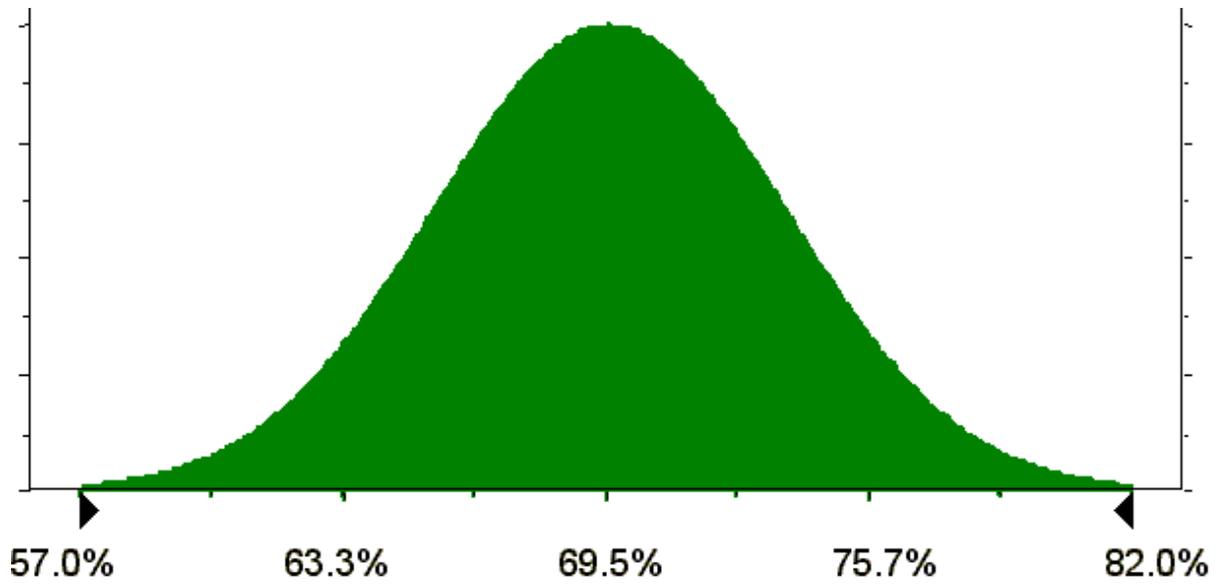


(k) FT Diesel and Naphtha Production Steam Credits

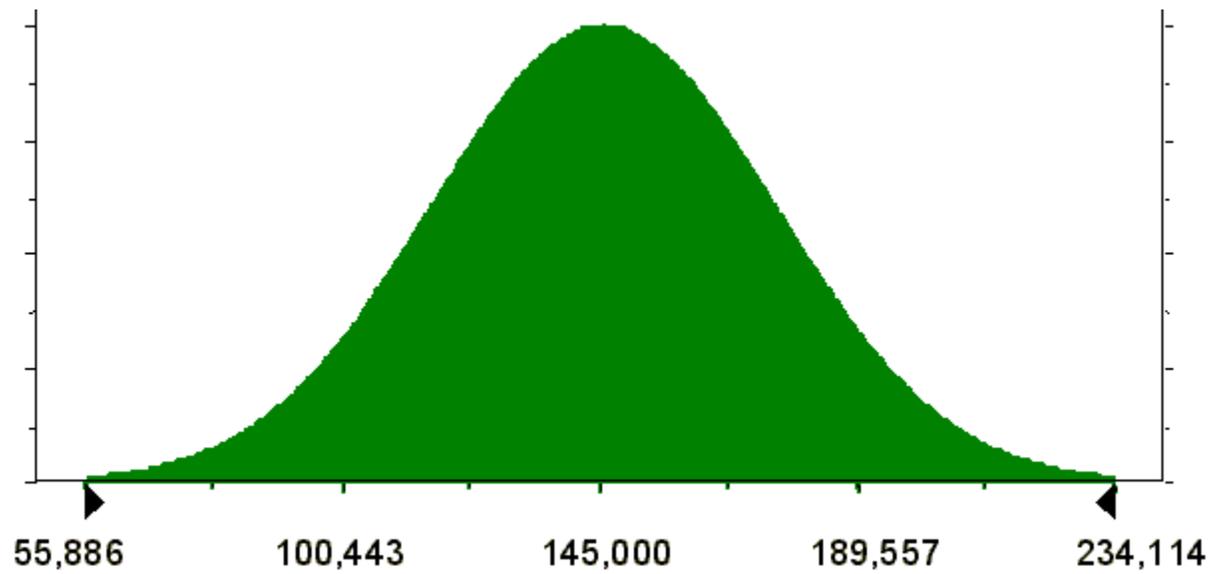


(l) G.H<sub>2</sub> Production Efficiency in Central Plants: with No Steam Production

Figure A2 (Cont.)

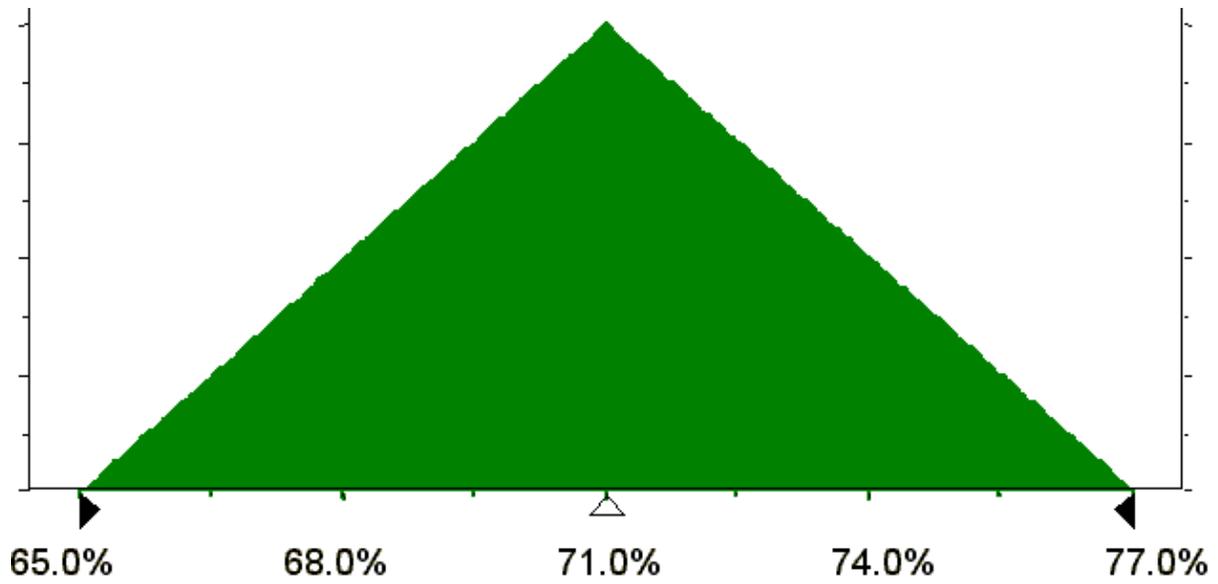


(m) G.H<sub>2</sub> Production Efficiency in Central Plants: with Steam Production

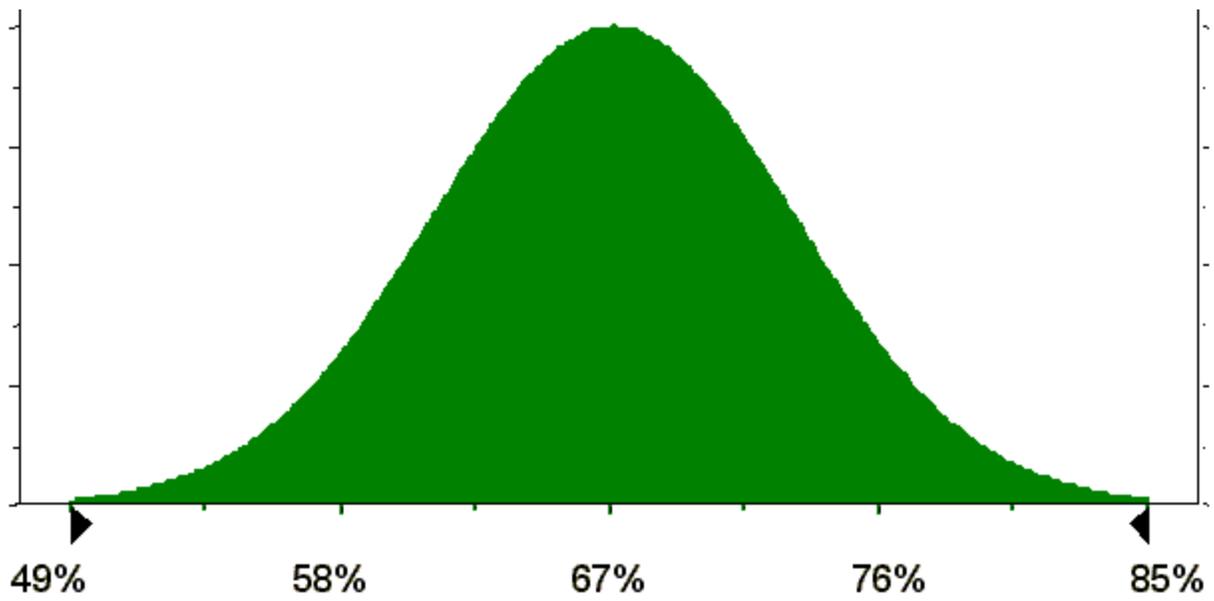


(n) G.H<sub>2</sub> Production Steam Credits in Central Plants

Figure A2 (Cont.)

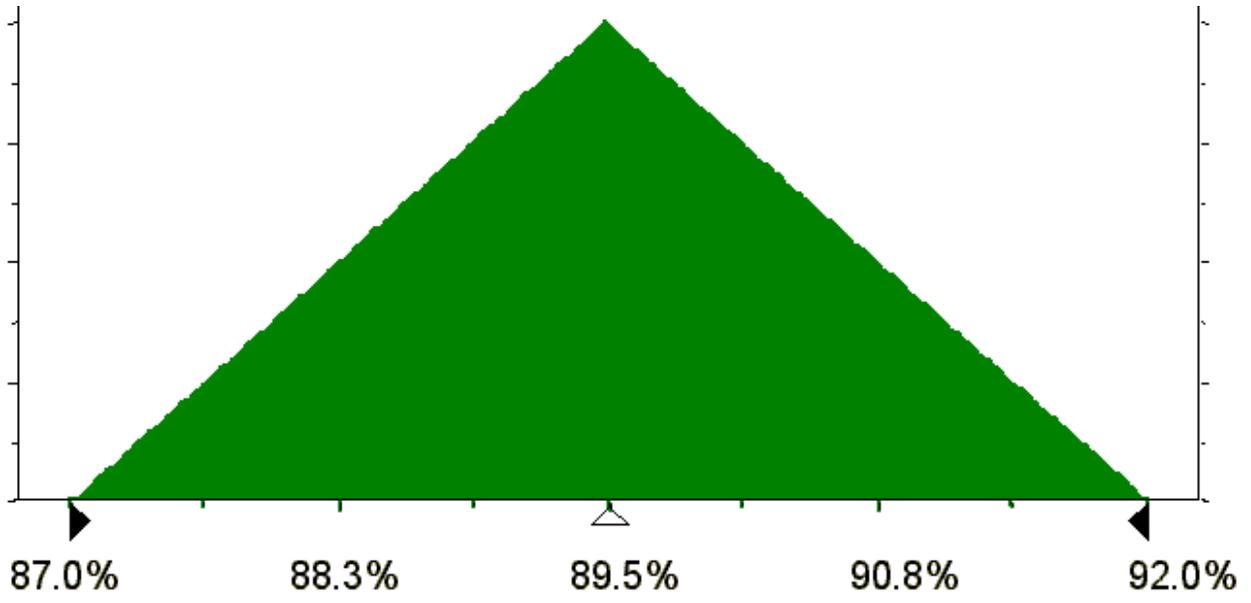


(o) H<sub>2</sub> Liquifaction Efficiency in Central Plants

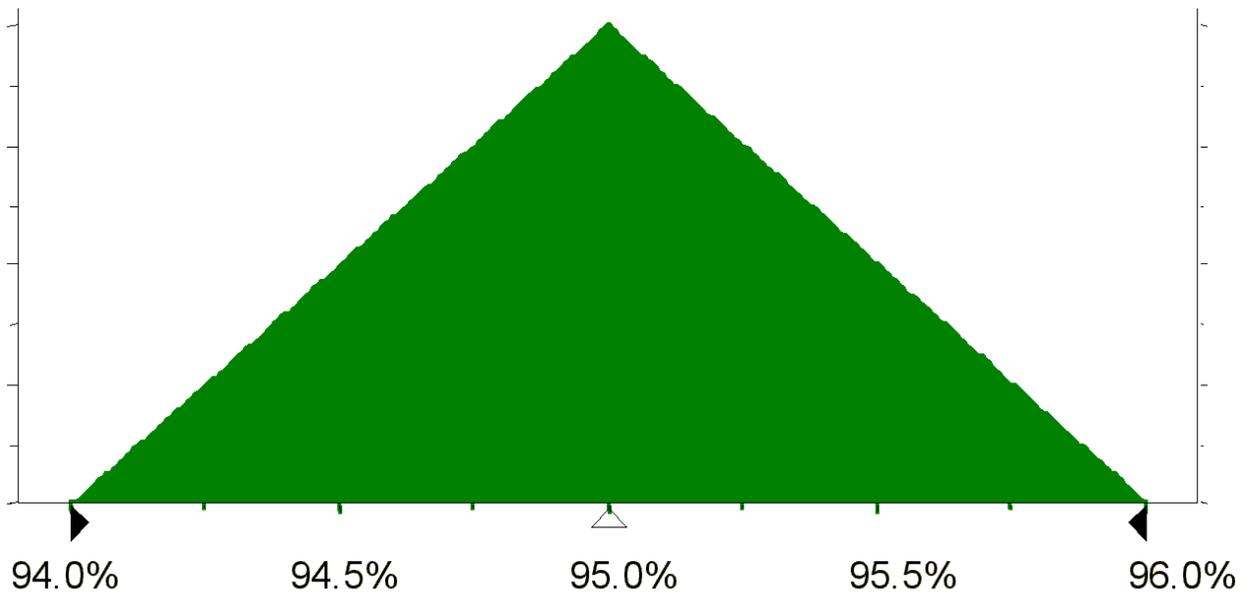


(p) G.H<sub>2</sub> Production Efficiency in Stations

Figure A2 (Cont.)

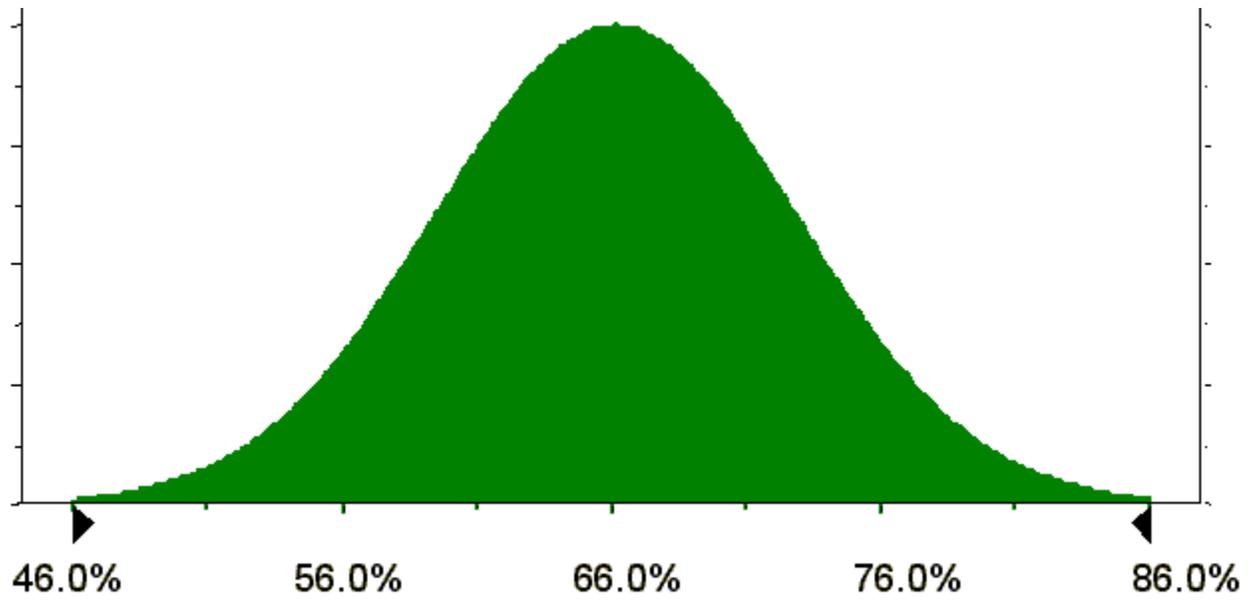


(q) G.H<sub>2</sub> Compression Efficiency in Stations: NG Compressor



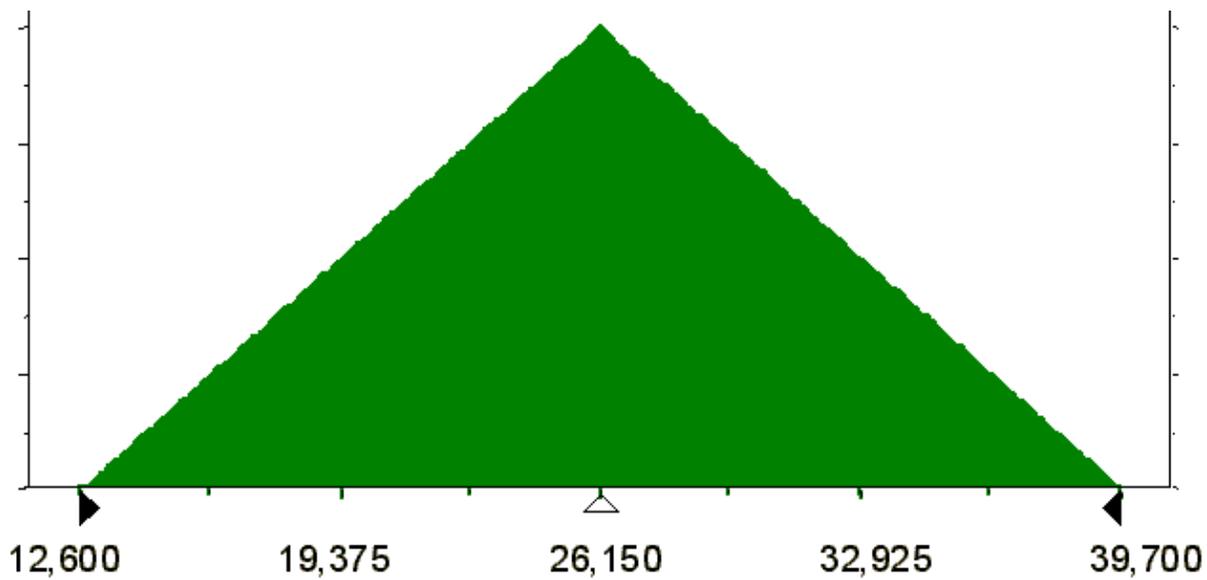
(r) G.H<sub>2</sub> Compression Efficiency in Stations: Electric Compressor

Figure A2 (Cont.)

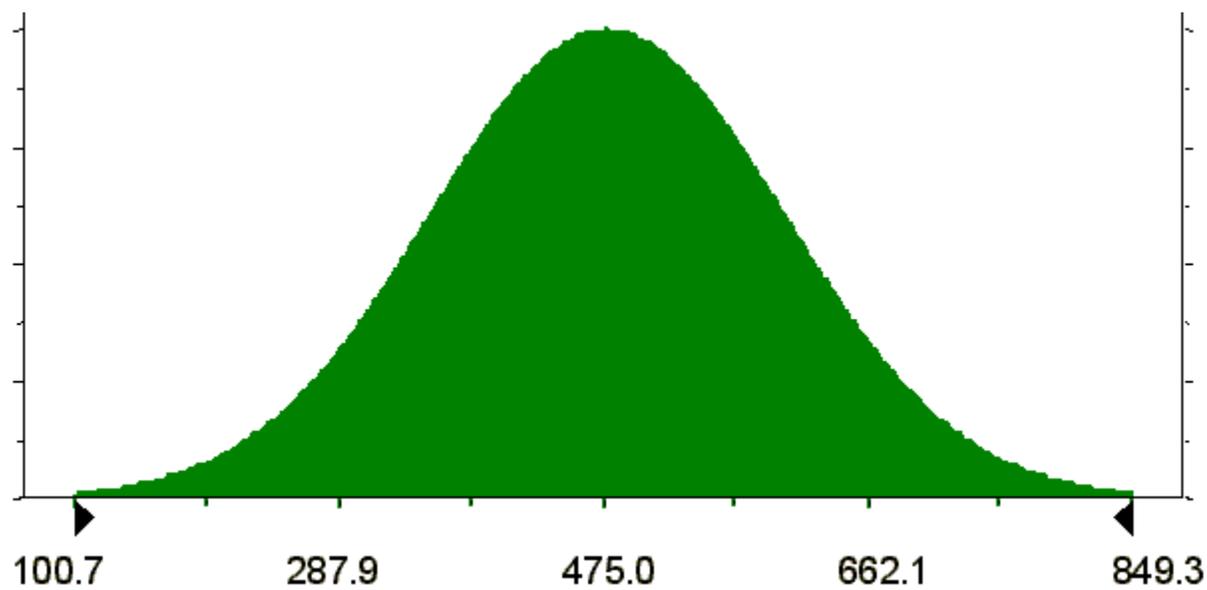


(s) H<sub>2</sub> Liquifaction Efficiency in Stations

Figure A2 (Cont.)

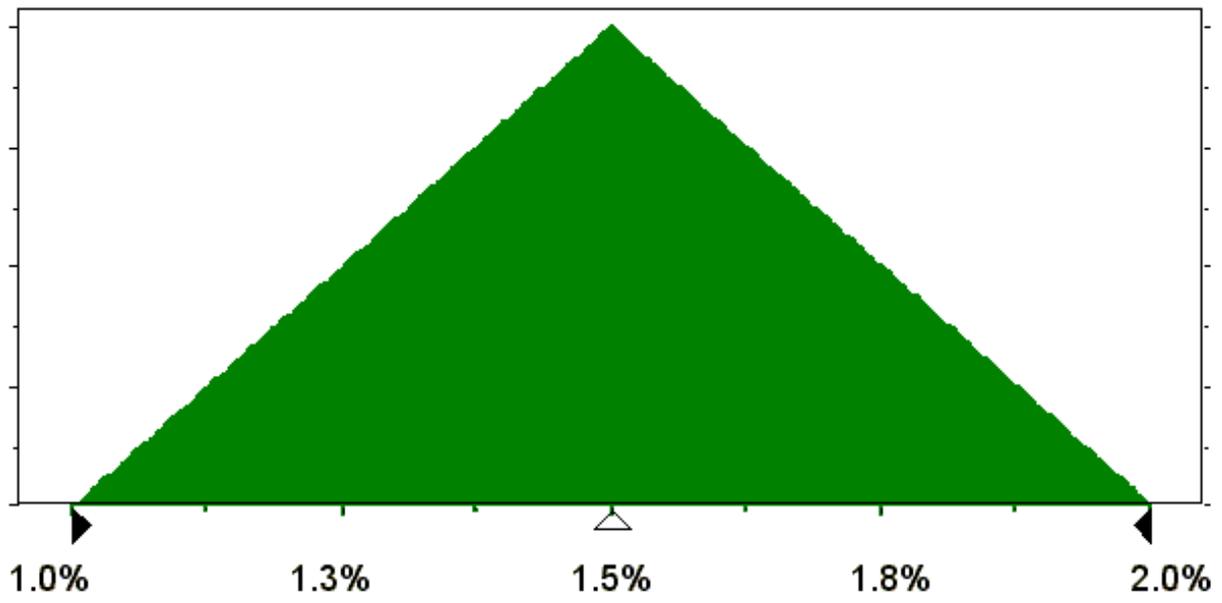


(a) Corn Farming Energy Use (Btu/bushel of corn harvested)

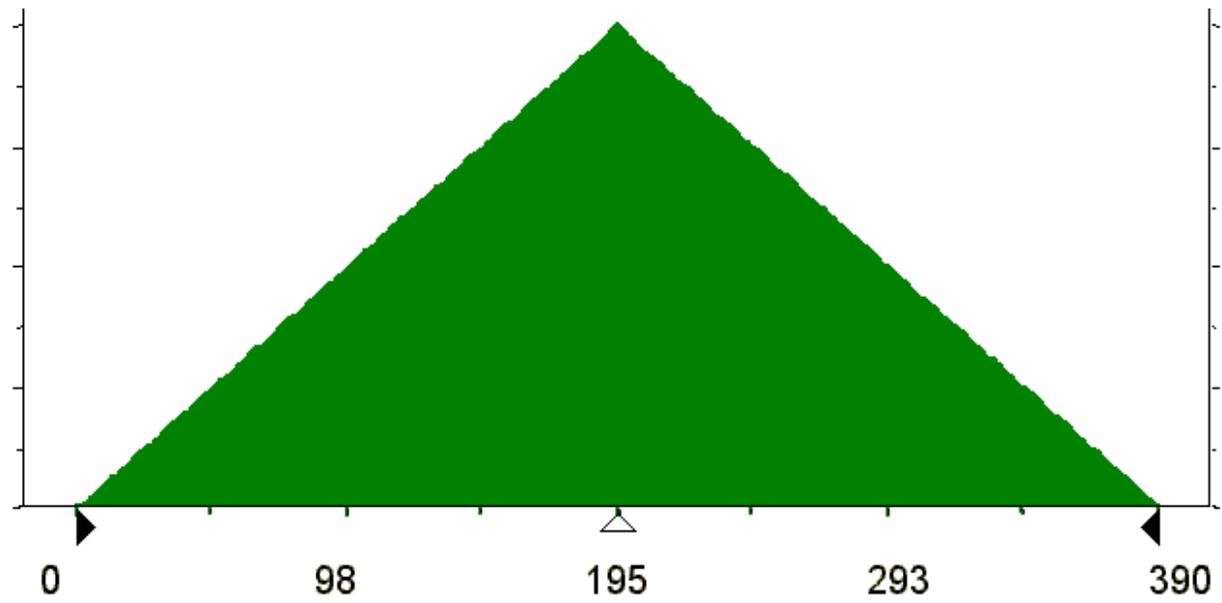


(b) N Fertilizer Use in Corn Farms (g/bushel of corn harvested)

Figure A3 Probability Distribution Functions for Bio-Ethanol Pathway Activities

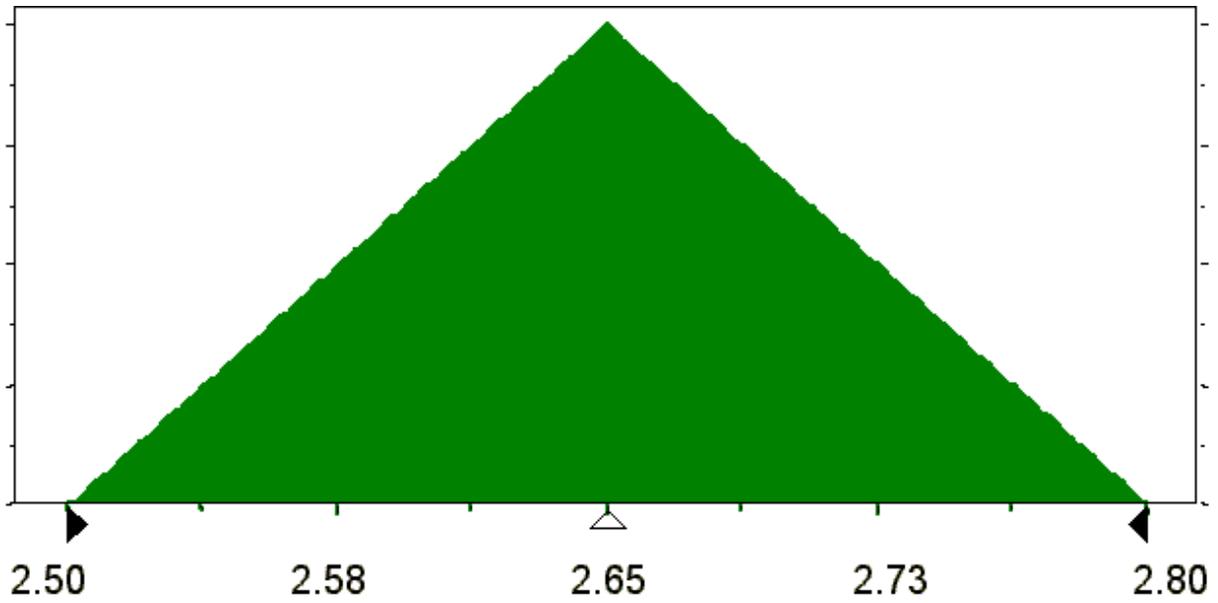


(c) N<sub>2</sub>O Emissions in Corn Farms (N in N<sub>2</sub>O as % of N in N fertilizer)

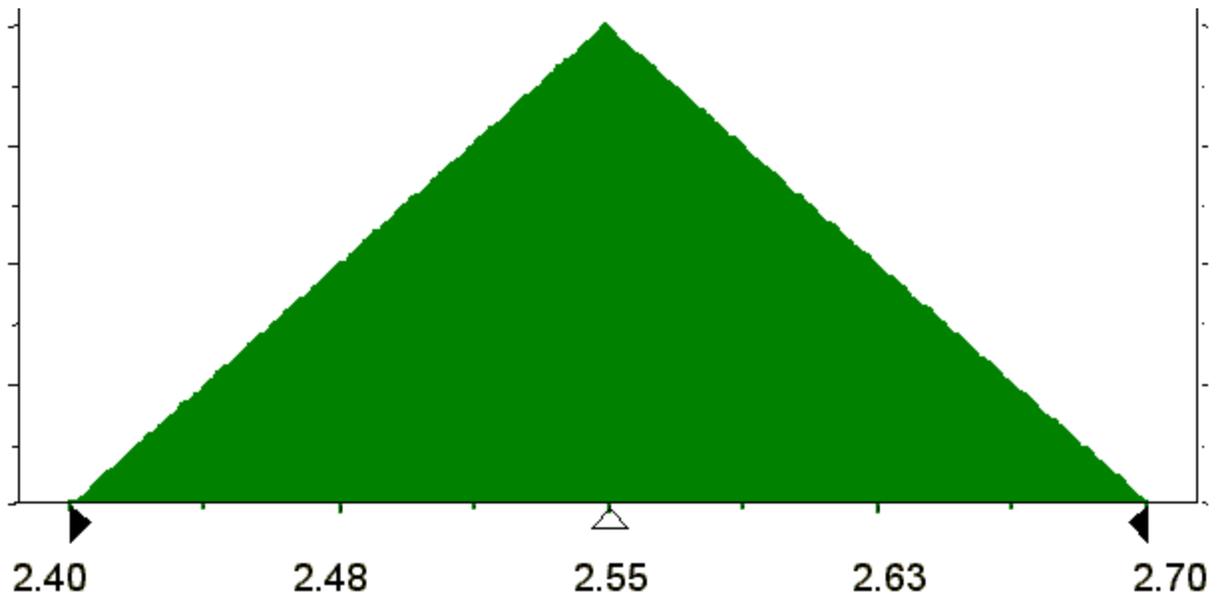


(d) Soil CO<sub>2</sub> Emissions in Corn Farms (g/bushel of corn harvested)

Figure A3 (Cont.)

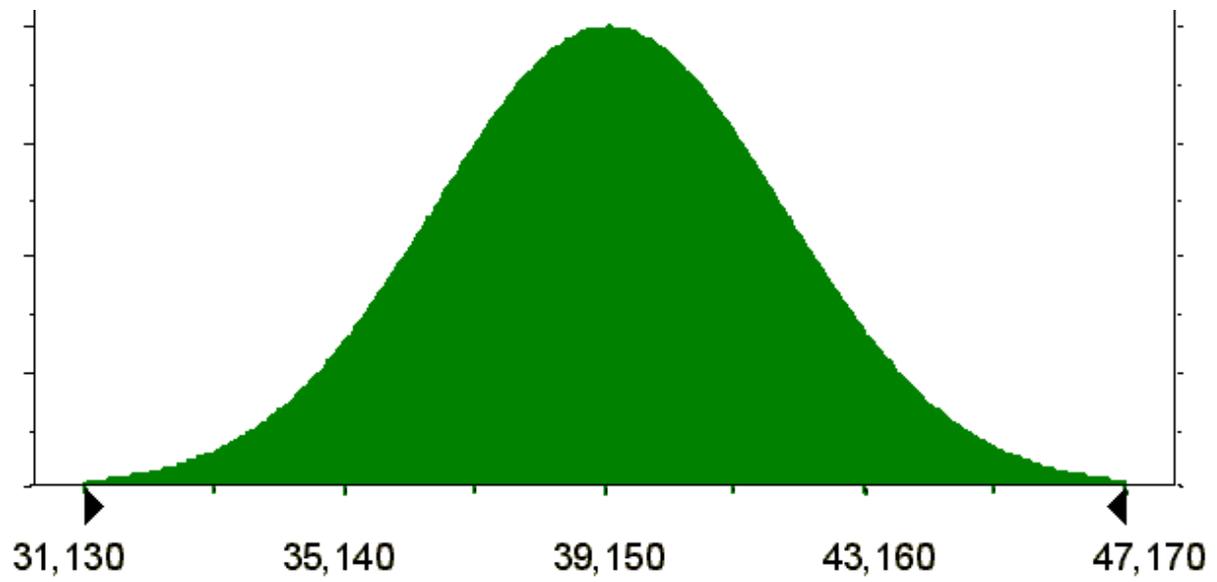


(e) Ethanol Yield in Corn Ethanol Plants: Dry Mill (gal/bushel of corn)

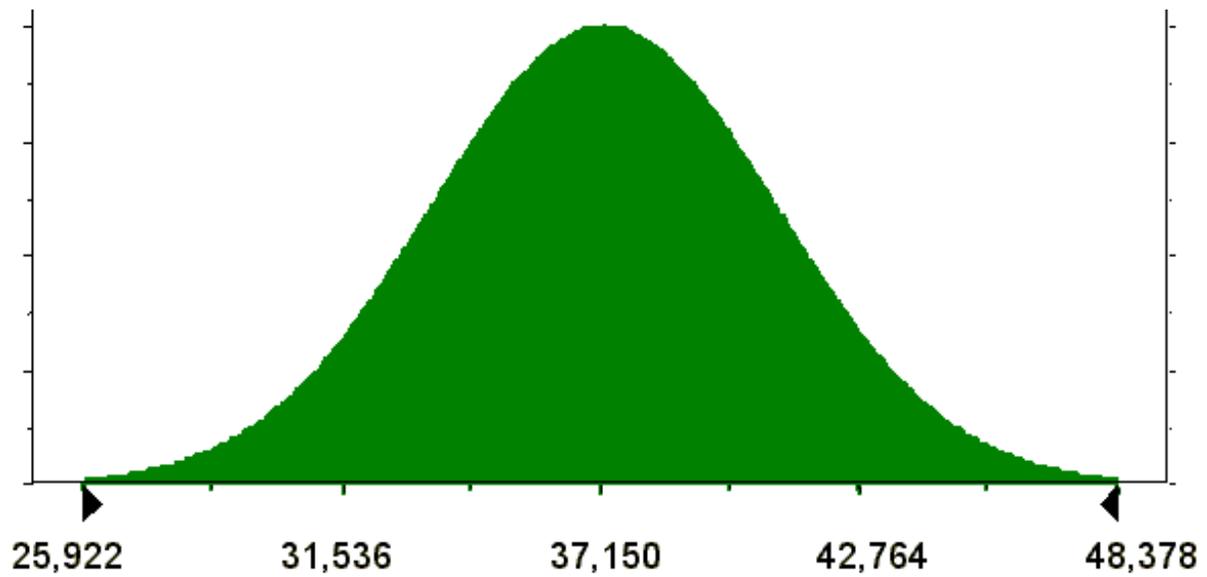


(f) Ethanol Yield in Corn Ethanol Plants: Wet Mil (gal/bushel of corn)

Figure A3 (Cont.)

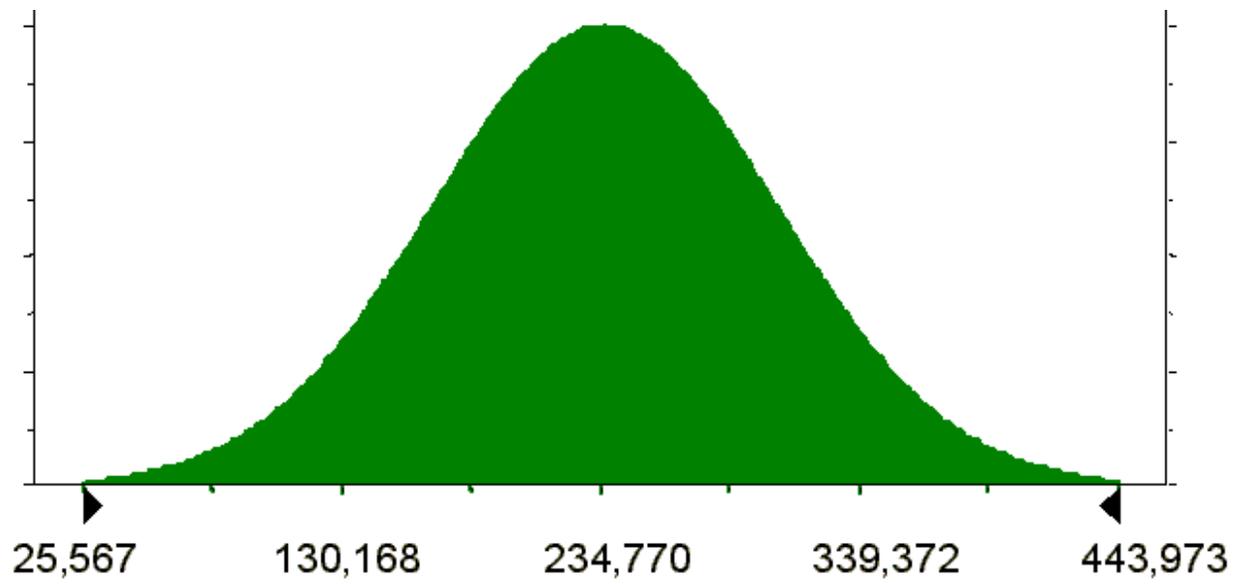


(g) Energy Use in Dry Mill Ethanol Plants (Btu/gal of ethanol)

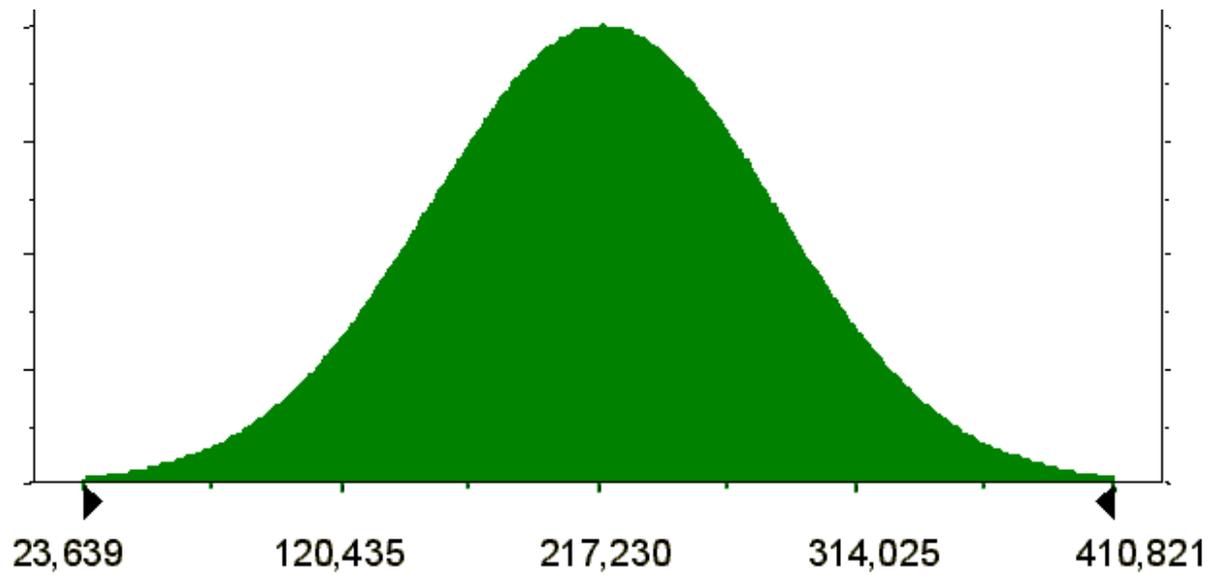


(h) Energy Use in Wet Mill Ethanol Plants (Btu/gal of ethanol)

Figure A3 (Cont.)

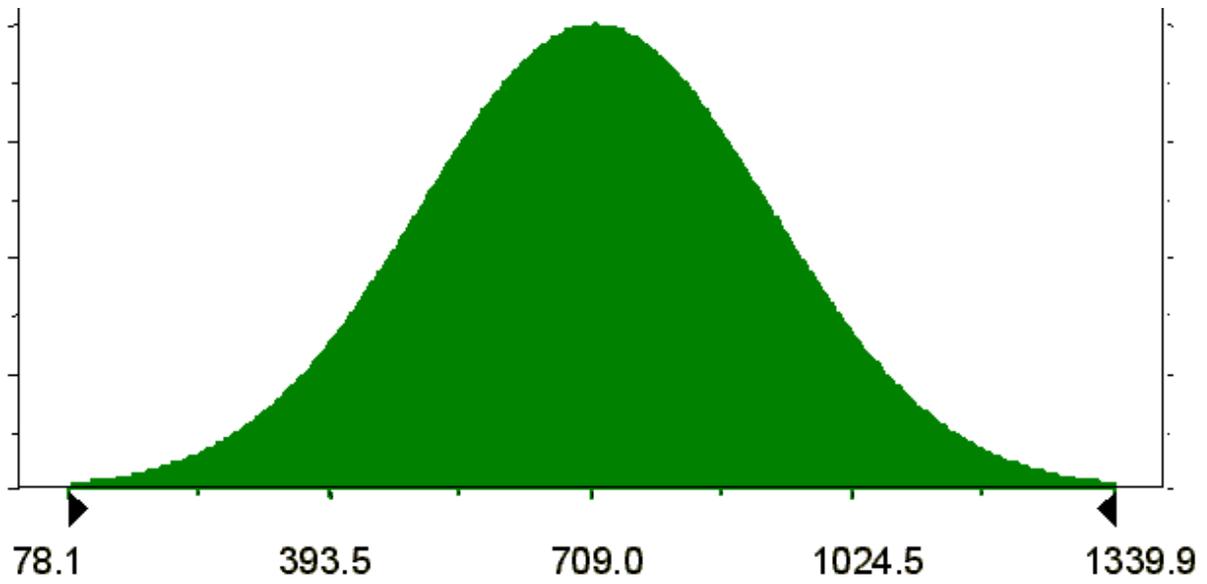


(i) Energy Use for Tree Farming (Btu/ton of trees harvested)

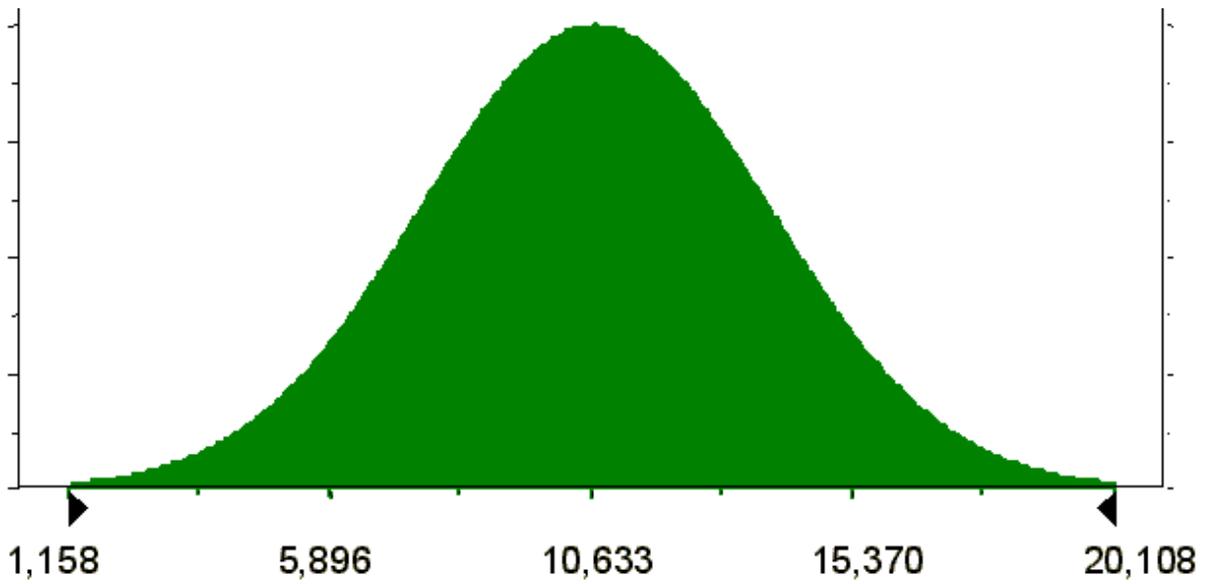


(j) Energy Use for Grass Farming (Btu/ton of grasses harvested)

Figure A3 (Cont.)

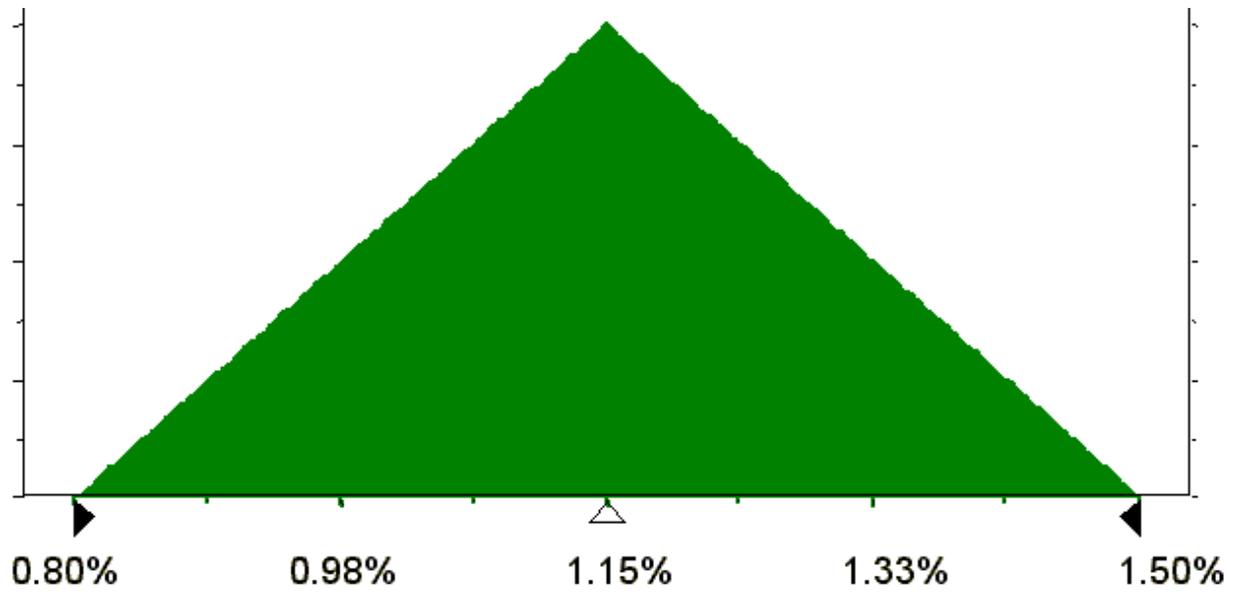


(k) N Fertilizer Use for Tree Farming (g/ton of trees harvested)

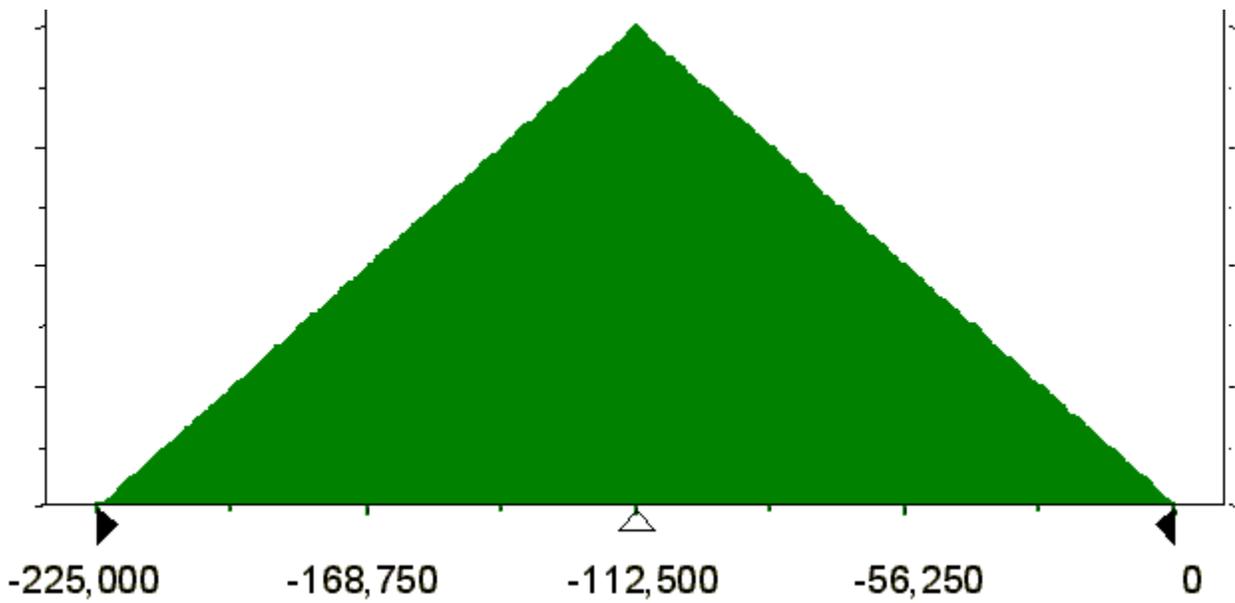


(l) N Fertilizer Use for Grass Farming (g/ton of grasses harvested)

Figure A3 (Cont.)

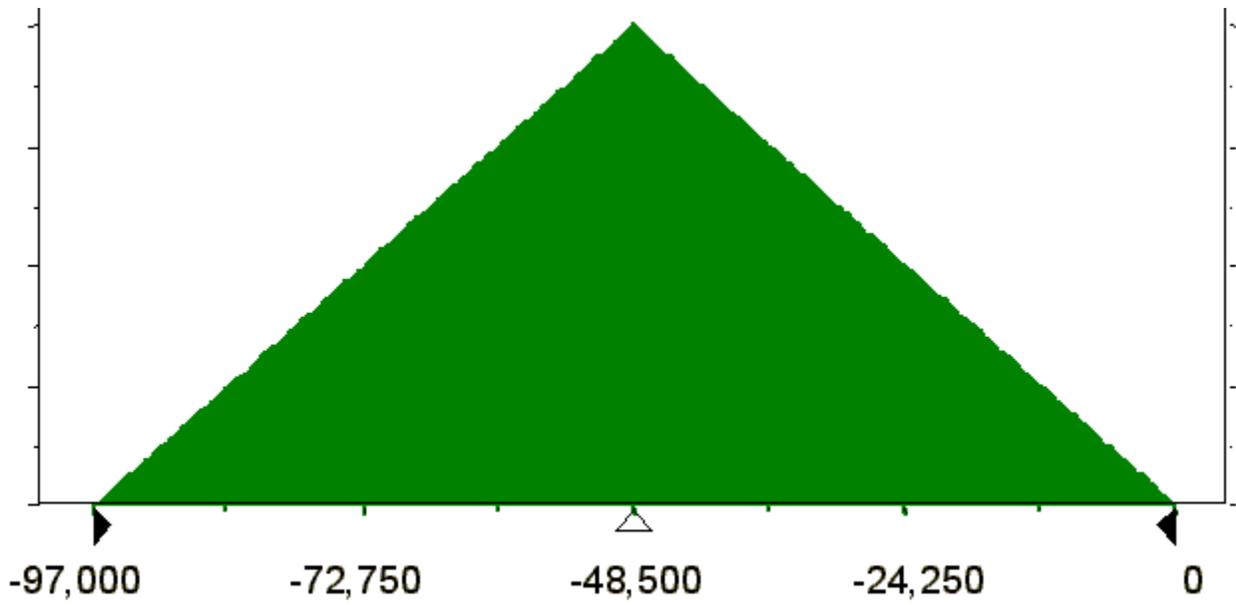


(m) N<sub>2</sub>O Emissions in Biomass Farms (N in N<sub>2</sub>O as % of N in N fertilizer)

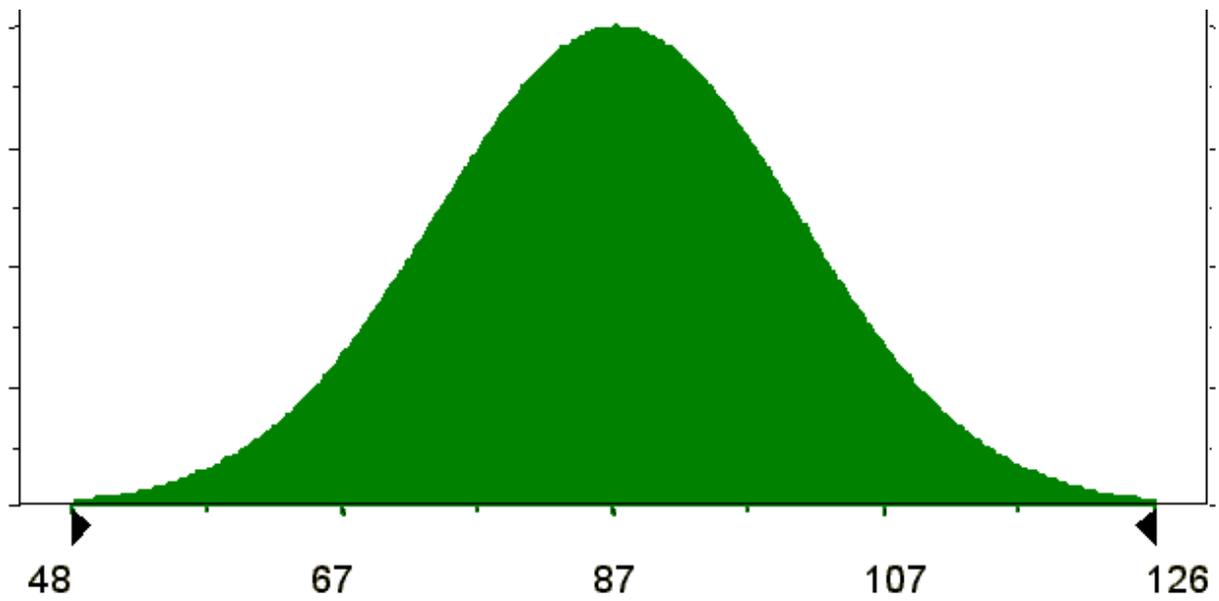


(n) Soil CO<sub>2</sub> Sequestration in Tree Farms (g/ton of trees harvested)

Figure A3 (Cont.)

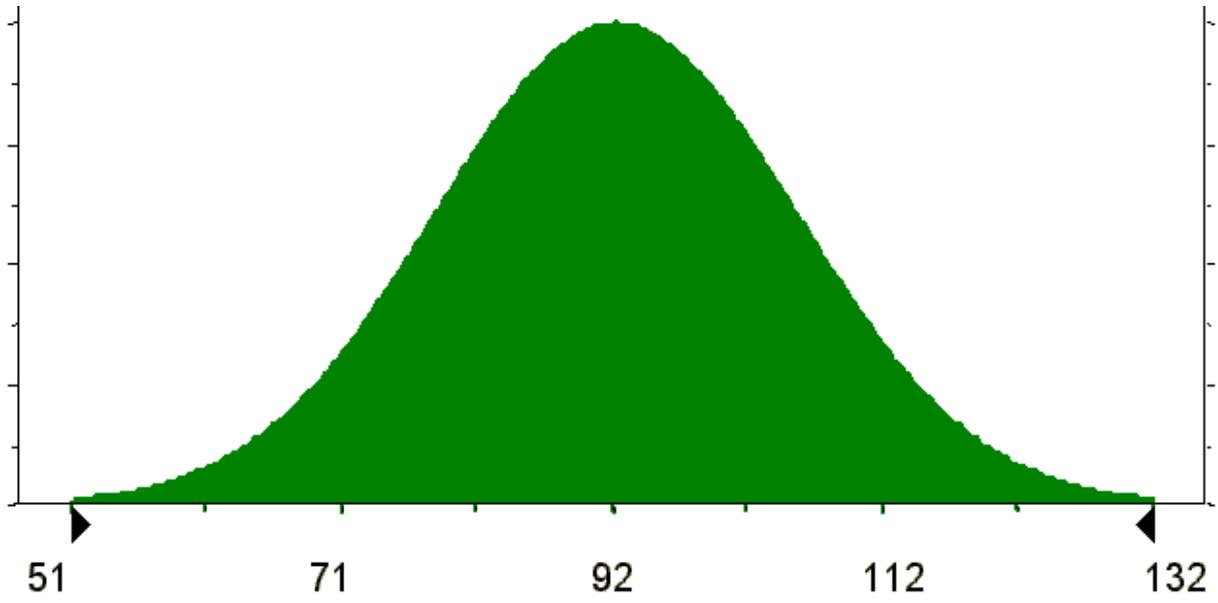


(o) Soil CO<sub>2</sub> Sequestration in Grass Farms (g/ton of grasses harvested)

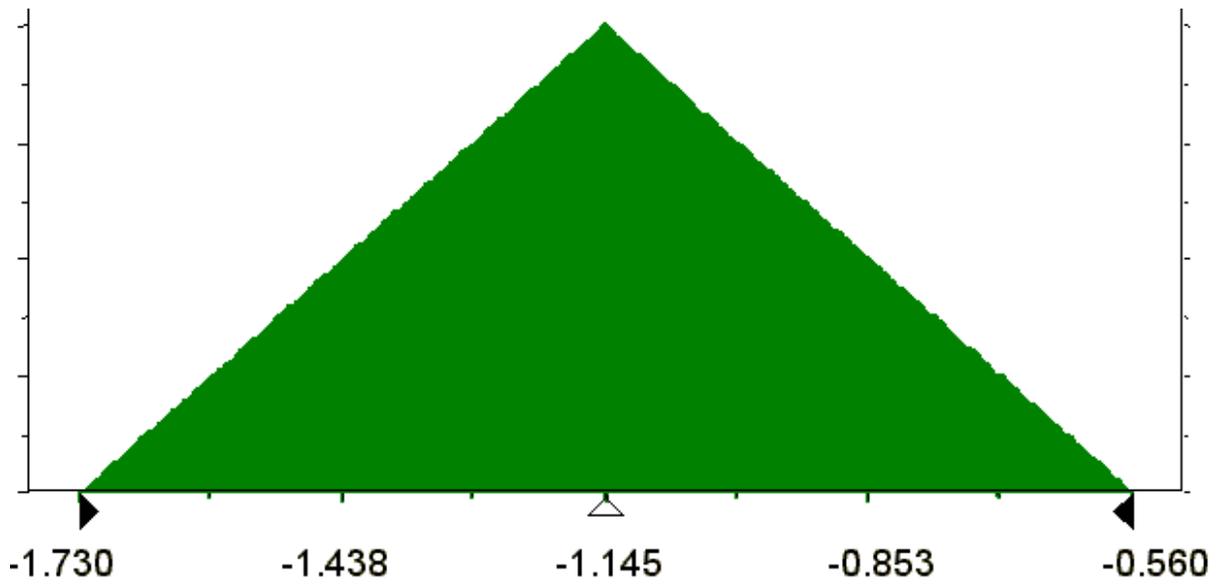


(p) Ethanol Yield in Woody Biomass Ethanol Plants (gal/ton of woody biomass)

Figure A3 (Cont.)

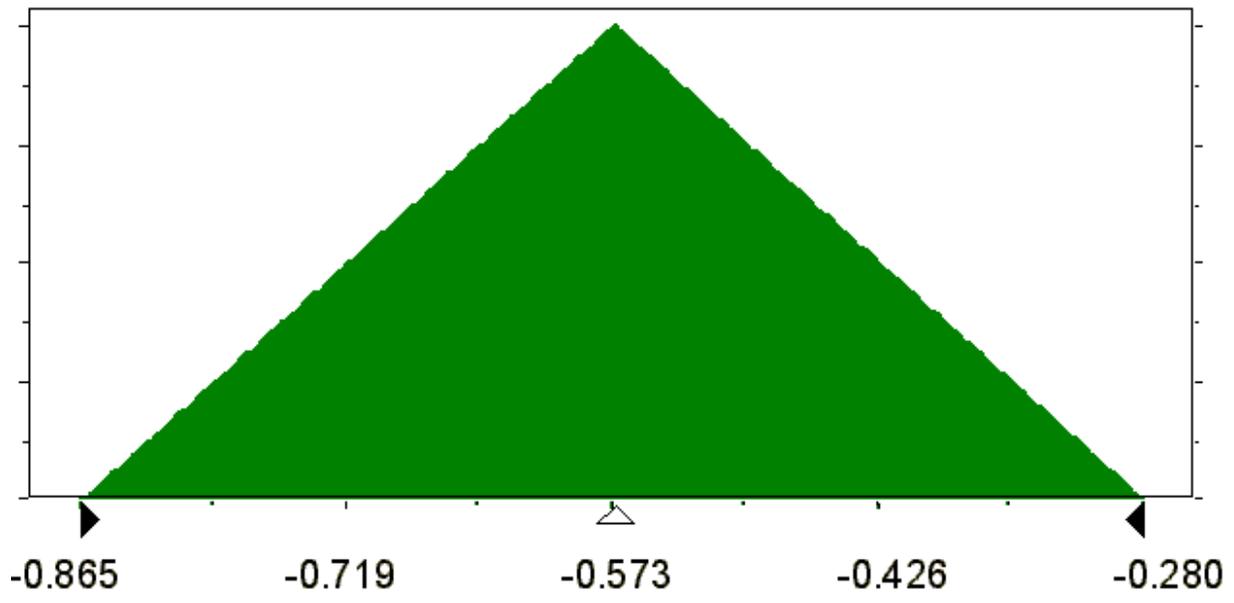


(q) Ethanol Yield in Herbaceous Biomass Ethanol Plants (gal/ton of herbaceous biomass)



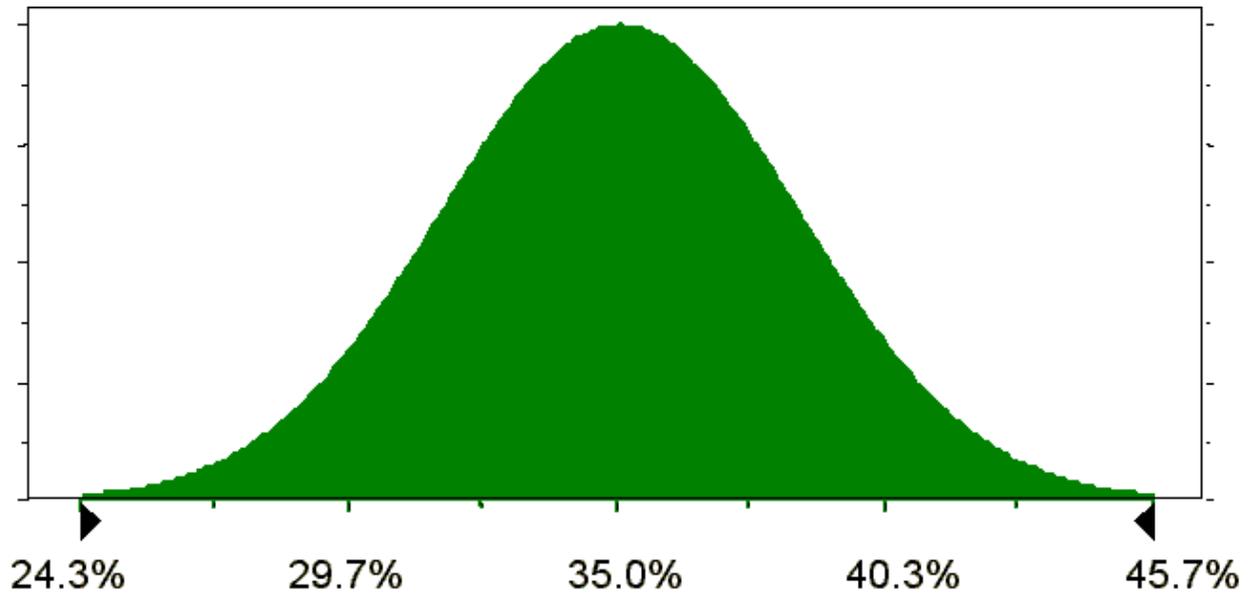
(r) Electricity Credits of Woody Biomass Ethanol Plants (kWh/gal of ethanol)

Figure A3 (Cont.)

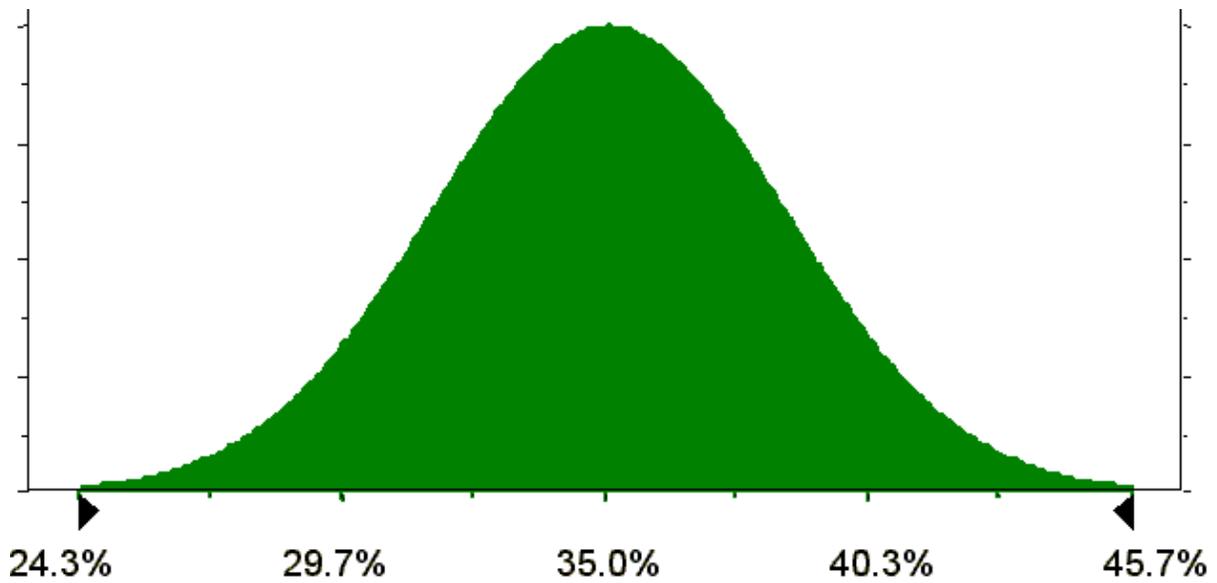


(s) Electricity Credits of Herbaceous Biomass Ethanol Plants (kWh/gal of ethanol)

Figure A3 (Cont.)

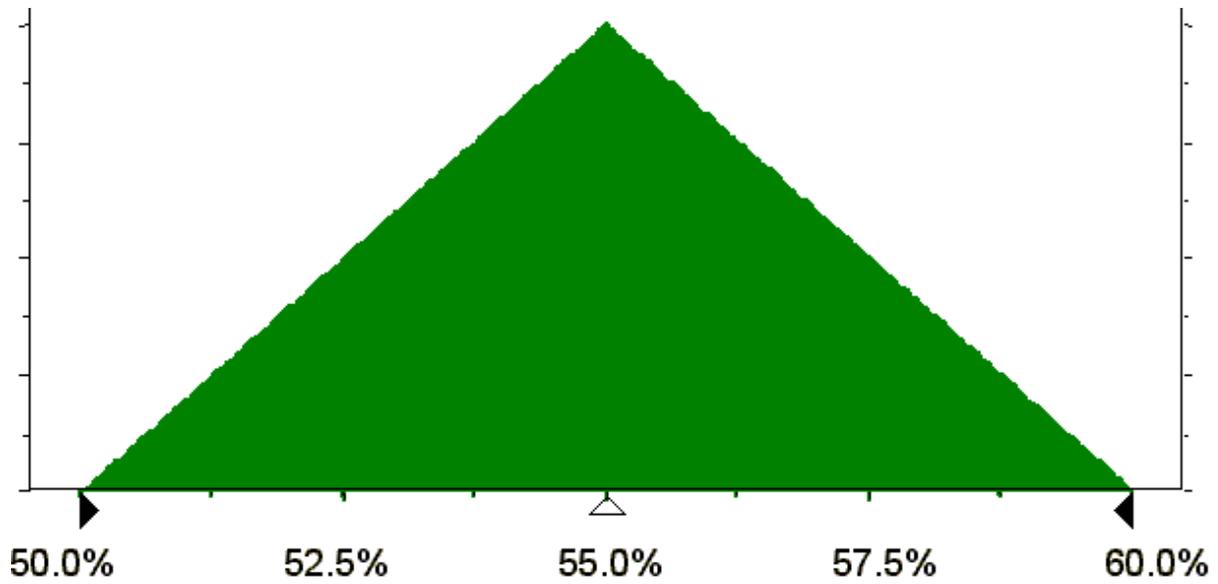


(a) Conversion Efficiencies of Oil-Fired Power Plants: Steam Boilers

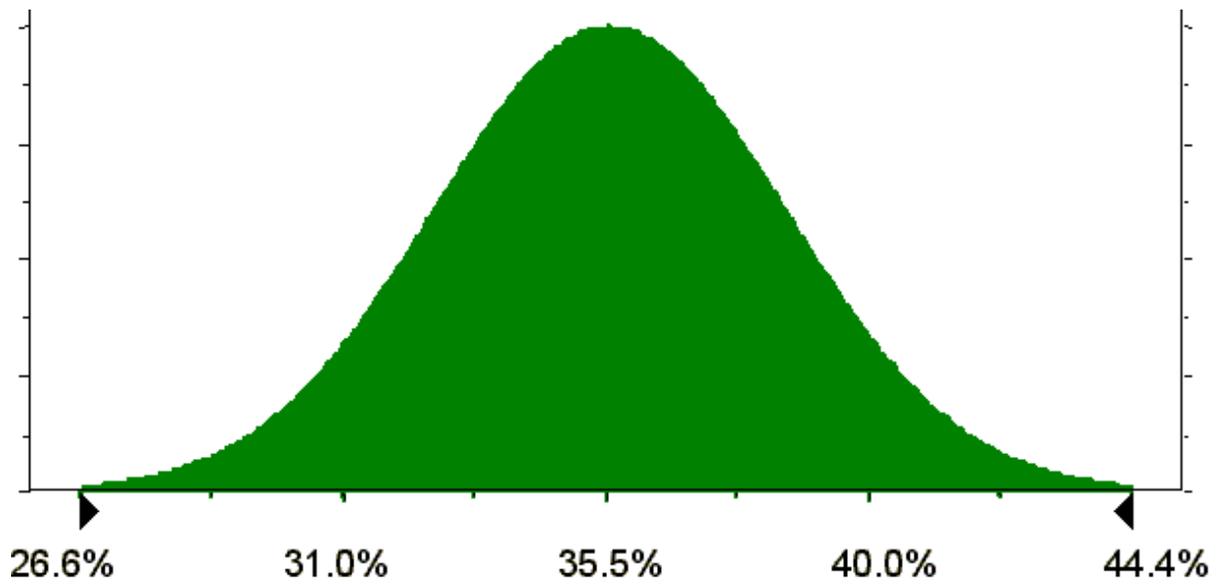


(b) Conversion Efficiencies of NG-Fired Power Plants: Steam Boilers

Figure A4 Probability Distribution Functions for Energy Efficiencies of Electric Power Plants

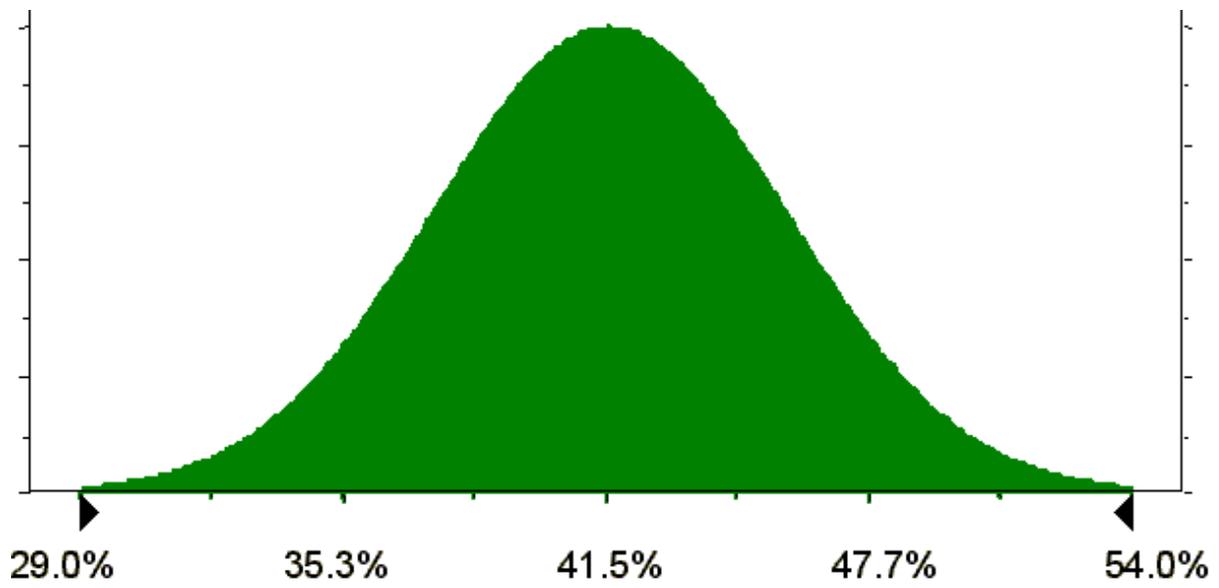


(c) Conversion Efficiencies of NG-Fired Power Plants: Combined-Cycle Turbines



(d) Conversion Efficiencies of Coal-Fired Power Plants: Steam Boilers

Figure A4 (Cont.)



(e) Conversion Efficiencies of Coal-Fired Power Plants: Advanced Technologies

Figure A4 (Cont.)

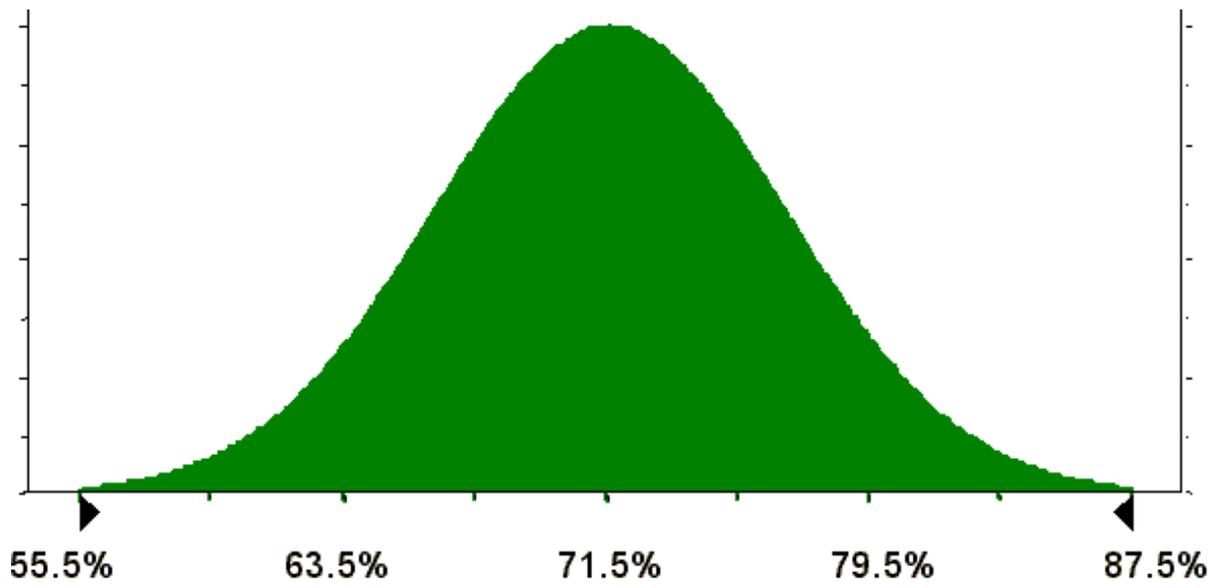


Figure A5 Probability Distribution Functions for Energy Efficiencies of Electrolysis H<sub>2</sub> Production

