**Methods for cooptimization planning and plan validation under uncertainty**

The purpose of this dissertation is to further our understanding of the long term planning generation and transmission cooptimization problem with particular emphasis on generating plans flexible to many scenarios. Unlike scenario analysis used to analyze a single scenario at a time in deterministic programs, probabilistic methods such as stochastic programming and adaptive programming are used to generate plans flexible to various futures within a single mathematical program. This dissertation initially analyzes the deterministic program on a realistic 300 bus representation of the Western Interconnection by characterizing the benefits of simultaneous generation and transmission cooptimization. It then introduces a method for for reducing the computational complexity of the deterministic problem and applies it to the Bonneville Power Administration's operational area. Finally, it provides a qualitative, quantitative, graphical, and simulated comparison of both stochastic and adaptive programming. In order simulate the performance of the two methods a folding horizon simulation is produced.