**MOTESA: Modeling Tools for Energy Systems Analysis­­**

**Power Opt Invest**

**Motivation/challenge**

* Retrofitting: adding things to existing plants (eg. reducing air emissions, improvements in the cooling system, handling coal ash)
* Cost a lot, path dependencies
* Long lived
* Outcome of investments uncertain
* Decision making is continuous

**Investment analysis**

* Consider current and potential future regulations
* Consider all possible alternatives
* Represents all managerial flexibility (what if we postponed this investment? Stages? Etc.)
* Consider uncertainty (iteration)

**What it is**

Decision support tool for analysis of capital investments at the plant level

Facilitate transparent evaluation of investment decision alternatives

* Huge tree for different scenarios (retrofit/build new/wait)

Characterizing uncertainty

Natural gas prices, EPA rules, co2 tax

* identify different levels for each uncertainty
* Determine possible scenarios (bundles of assumptions of the future)
* Produce forecasts for each scenario
* Determine current likelihood of each scenario
* Determine evolution of uncertainty for convergence on each scenario

User interface data too (UIDT)

**Rubenka’s Research**

Hybrid system: improve existing coal plant (retrofit, carbon capture, using wind sources)

Price arbitrage (sell electricity as much as possible when the price of electricity is highest during day/week, etc.)

Markov chain: Range of wind power (historical)

Weekly mean based on (perfectly) assumed weekly forecast

MCMC (time series) can be for demand, wind speed, wind power, electricity prices, etc.