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ParaChoice

Parametric Transportation Pathways Analysis

Dawn Manley, Garrett Barter

Sandia National Laboratories

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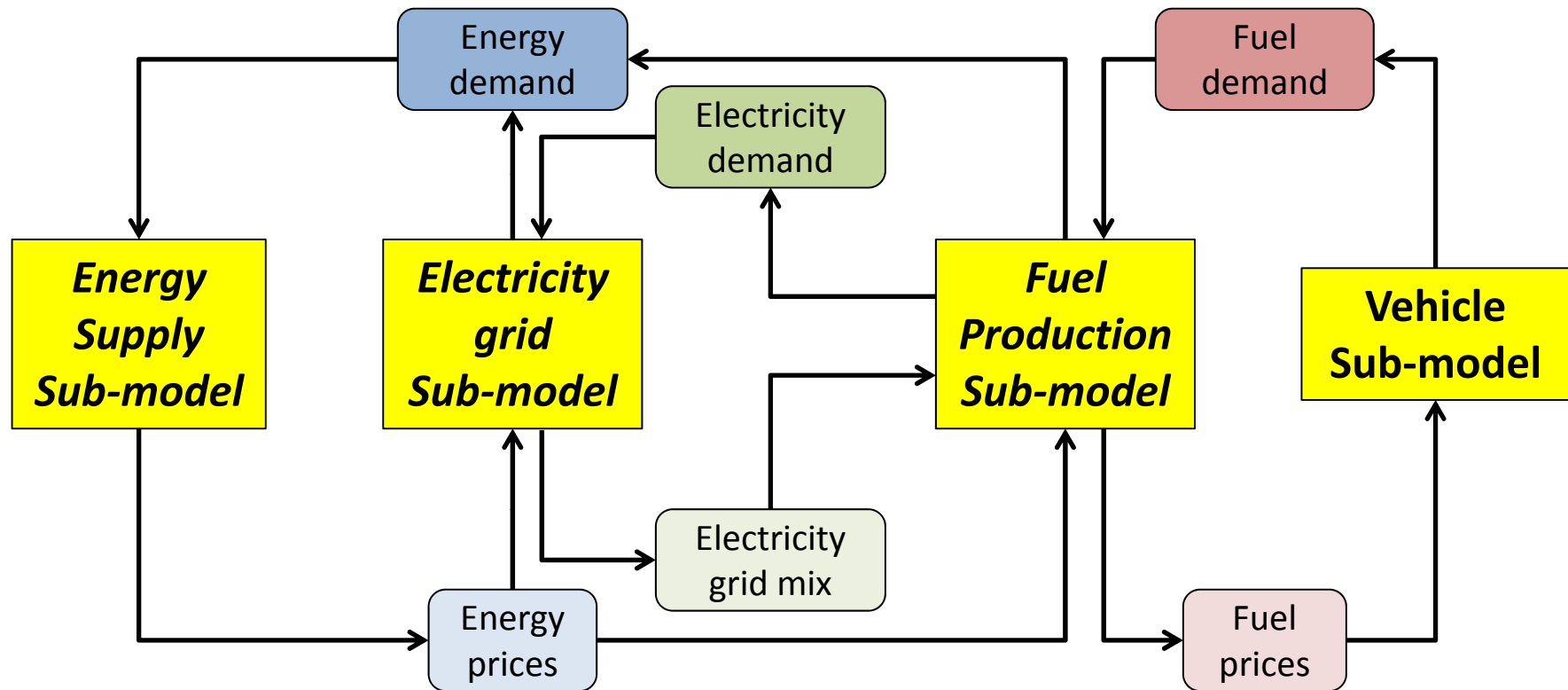


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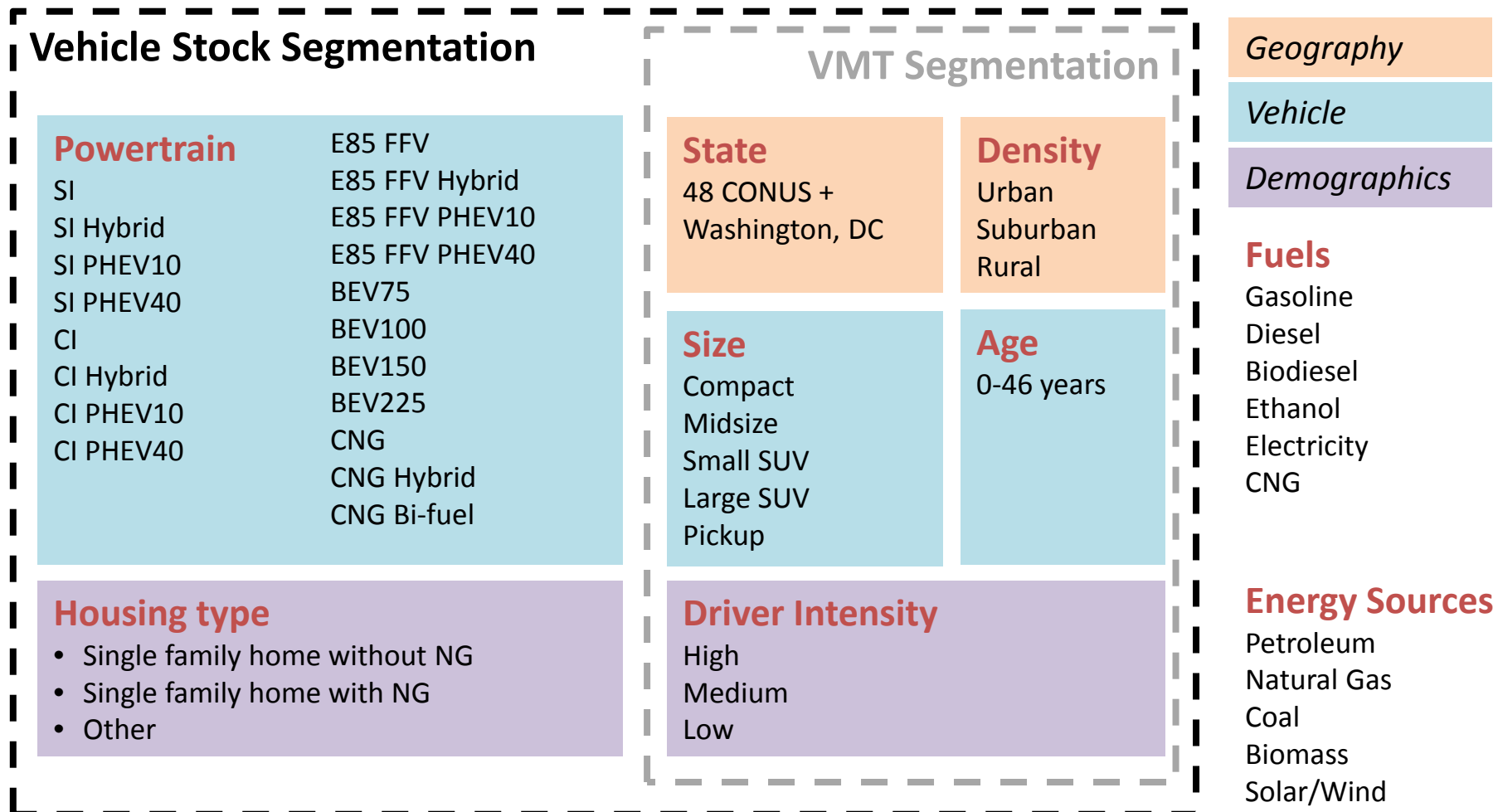
ParaChoice enables parametric analysis across factors that influence the vehicle, fuel, & infrastructure mix

- Captures **changes to the Light Duty Vehicle (LDV) stock through 2050** and its dynamic, economic relationship to fuels and energy sources
- Provides a **system-level analysis layer with input from other DOE models** to explore the uncertainty and trade space (with 10,000s of model runs) that is not accessible in individual scenario-focused studies
- Models **dynamics and competition** among LDV powertrains and fuels using **regional-level** feedback loops from vehicle use to energy source
 - Technologies are allowed to flourish or fail in the marketplace
- We seek to identify:
 - The set of conditions that must be true to reach performance goals
 - Sensitivities and tradeoffs between technology investments, market incentives, and modeling uncertainty

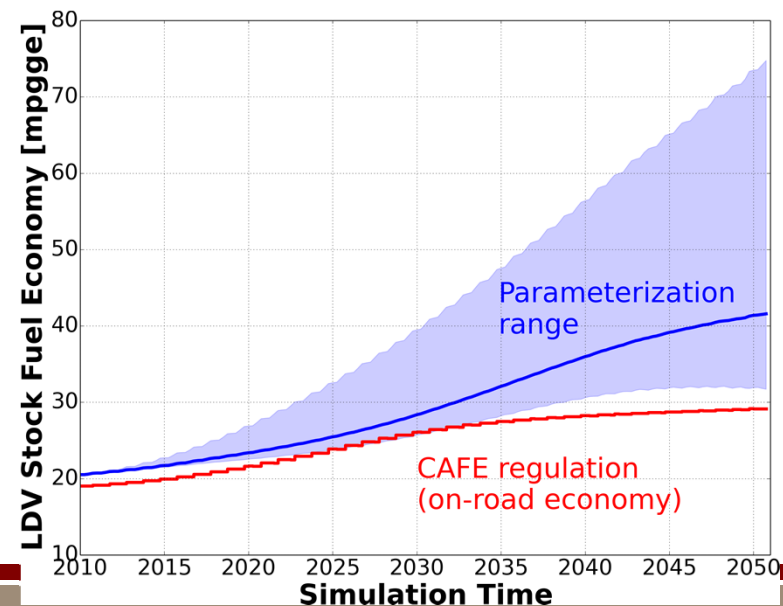
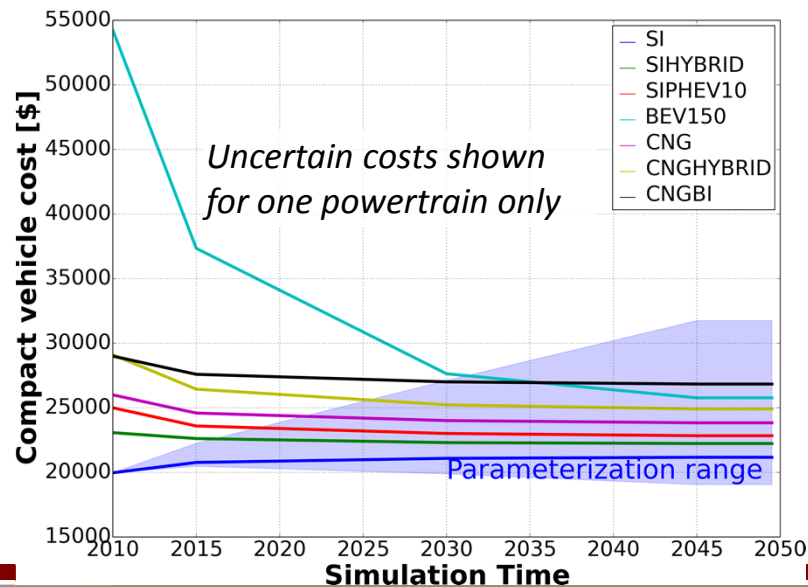
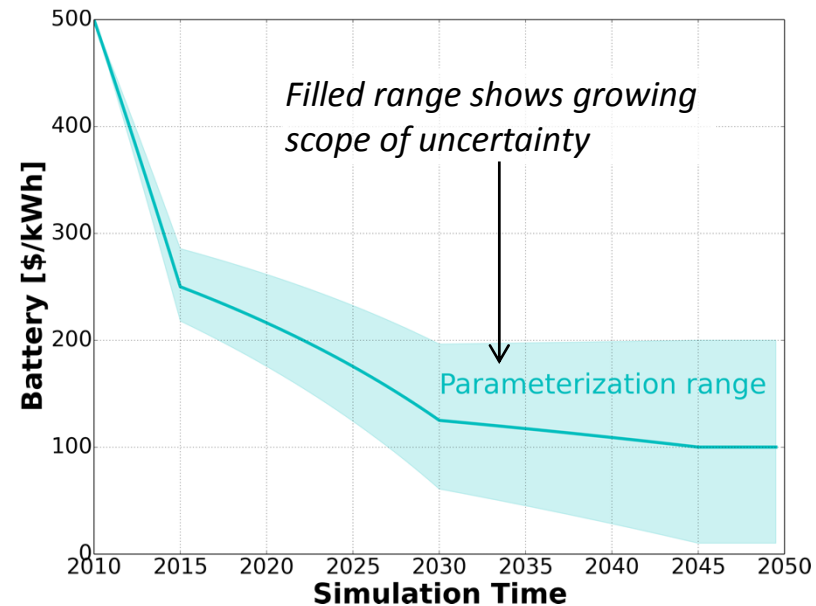
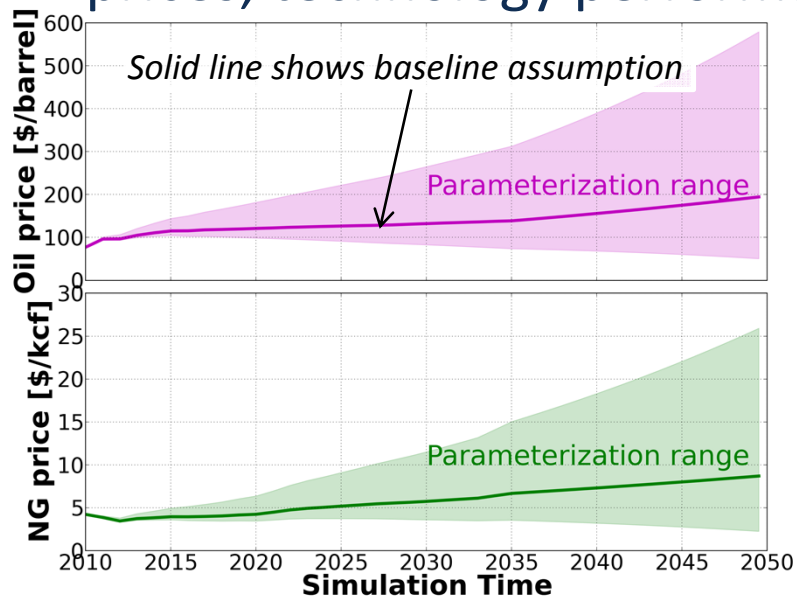
Modeling Approach: System dynamics enables feedback between energy supply<-->energy carrier<-->vehicle



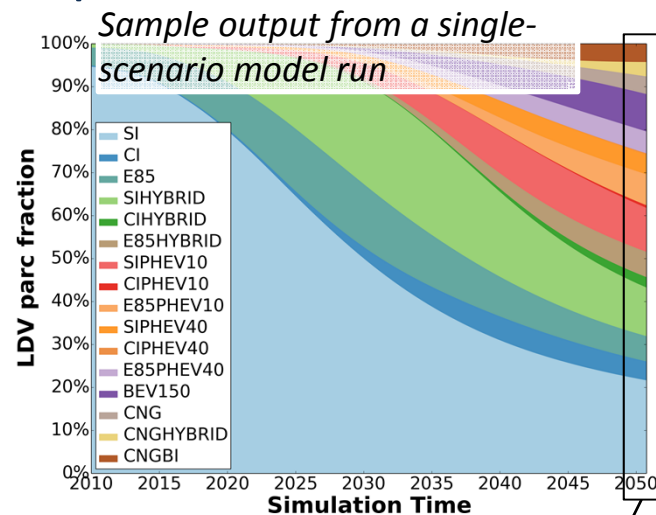
Modeling Approach: The model has many segments to capture the different niches of LDV consumers



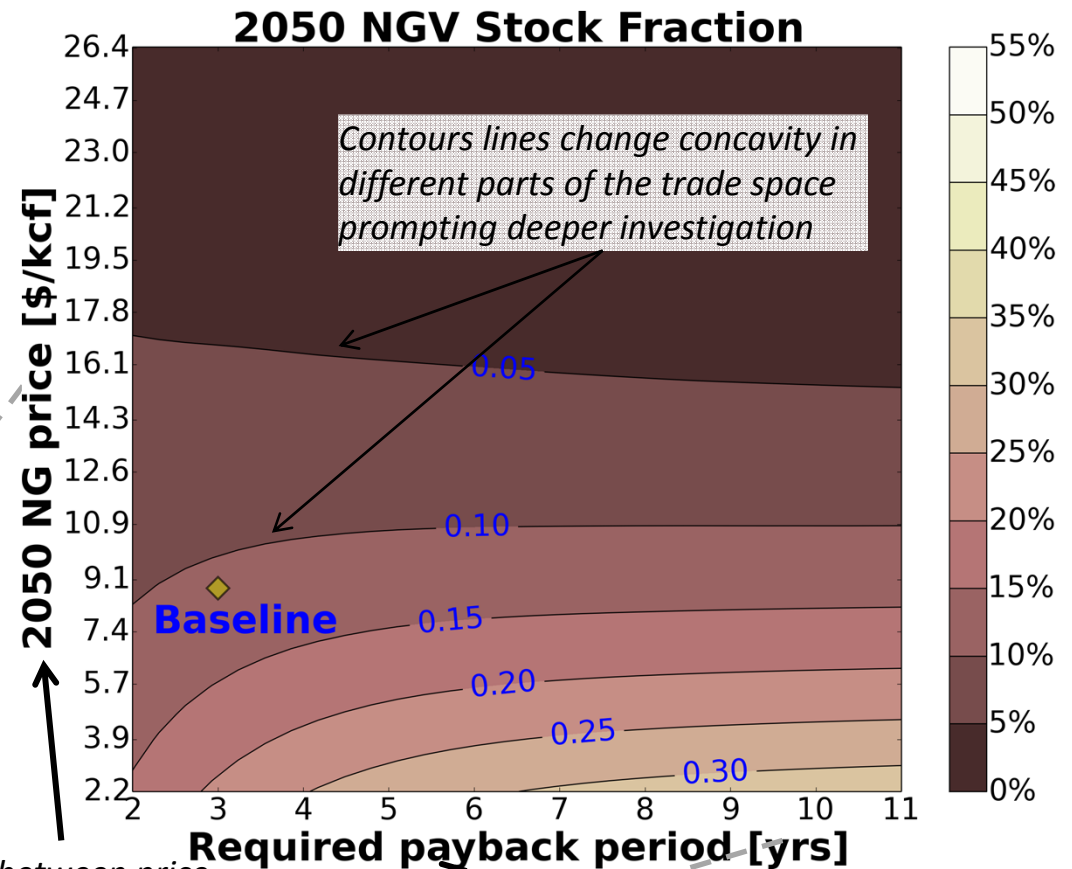
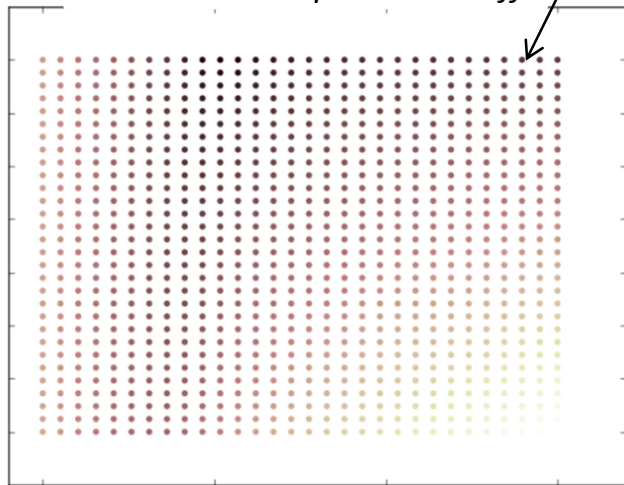
Parameterization helps account for uncertainty in commodity prices, technology performance, modeling assumptions, etc.



Example results: Parametric studies focus on one, two, and all parameter variations to explore the trade space



Parameter space is sampled 1000 times to explore tradeoffs



Tradeoff between price uncertainty and market incentives

Contour features reveal trade-space insights

Summary

- ParaChoice provides a parametric approach to vehicle choice modeling that includes feedback loops to fuel production and raw energy stocks.
- Parametric approach reveals the sets of conditions that must be true to reach performance goals and the tradeoffs present in the uncertainty space.