

Simple Building Calculator

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NEED

- 50% of floor space and 94% of buildings are < 50,000 ft²
- Custom energy analysis for small buildings with simple HVAC systems can be costly compared to savings
- There is a need to analyze both retrofits and high efficiency new buildings with simple inputs
- Prescriptive approaches may have diminishing returns and do not directly achieve performance targets
- Performance approach allows flexibility, accounts for integrated design, and achieves greater savings

SOLUTION

Simple Building Calculator

- Web-based tool for small and simple commercial buildings
- Generates quick, interactive energy estimates of efficiency measures.
- Needs simple inputs of most impactful building components.
- Provides quick scenario comparisons
- Helps explore options to reach a performance target

SBC FEATURES

Input Parameters:

- Envelope
- Internal Load
- Occupancy Controls
- HVAC

Climate Zones:

- 2A (hot, humid)
- 4 (mixed, maritime)
- 8 (subarctic)

Building Types:

- Office
- Retail

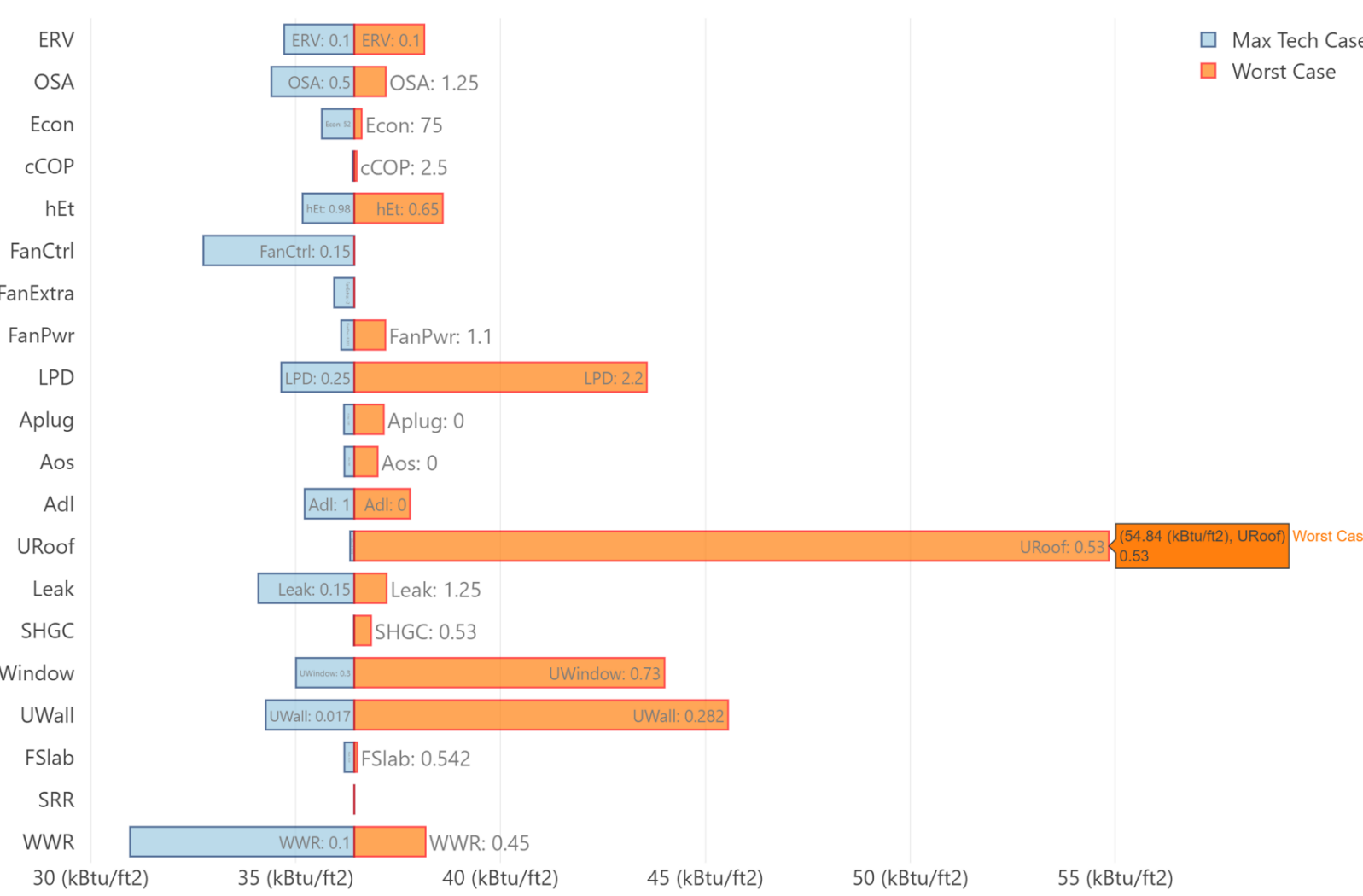
Outputs:

- Site energy
- Source energy
- Energy cost
- Carbon emissions
- Scenario comparison
- Energy code comparison

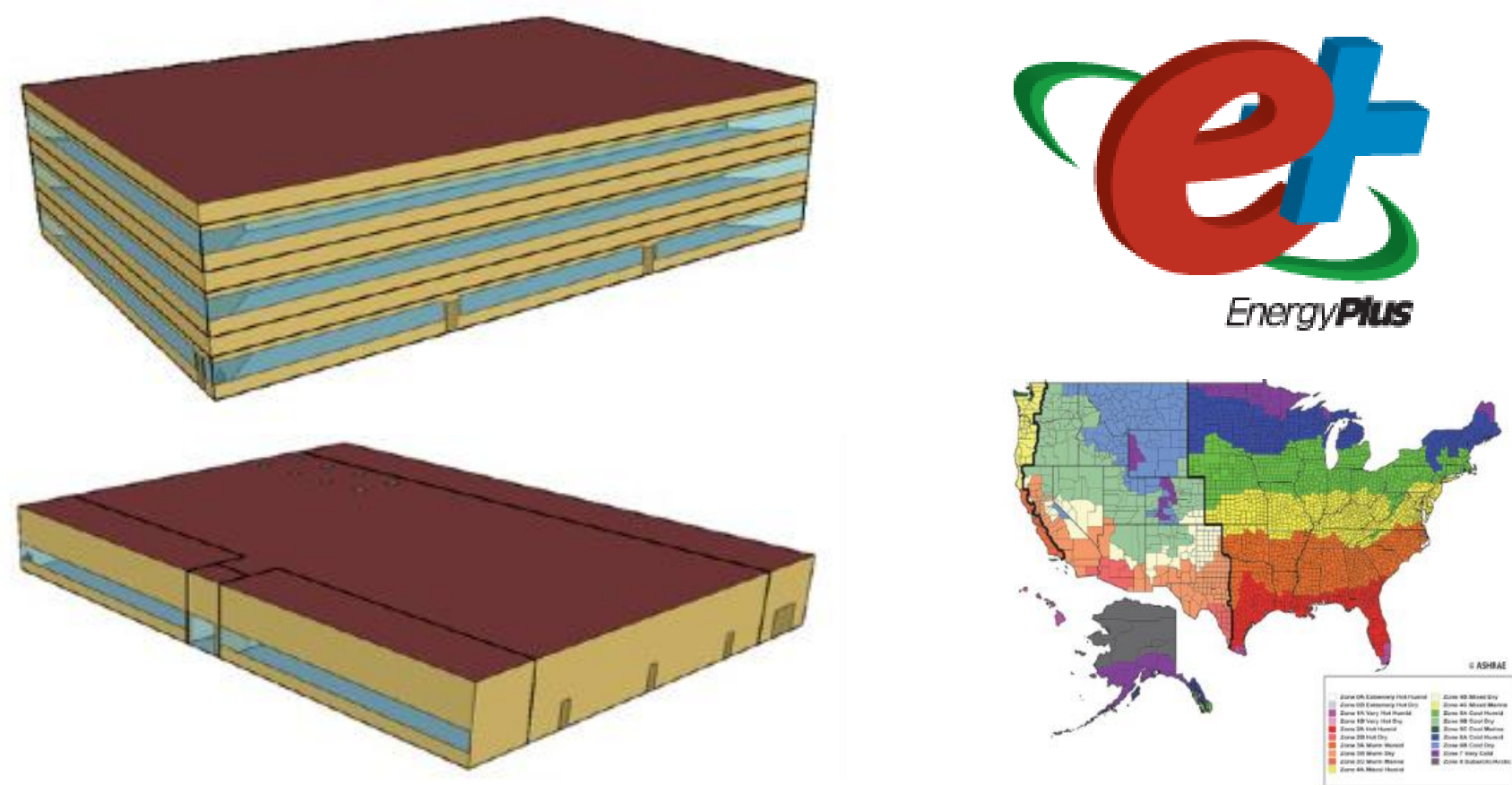


METHODOLOGY

I. Sensitivity Analysis – to identify prominent energy impact parameters for specific building types



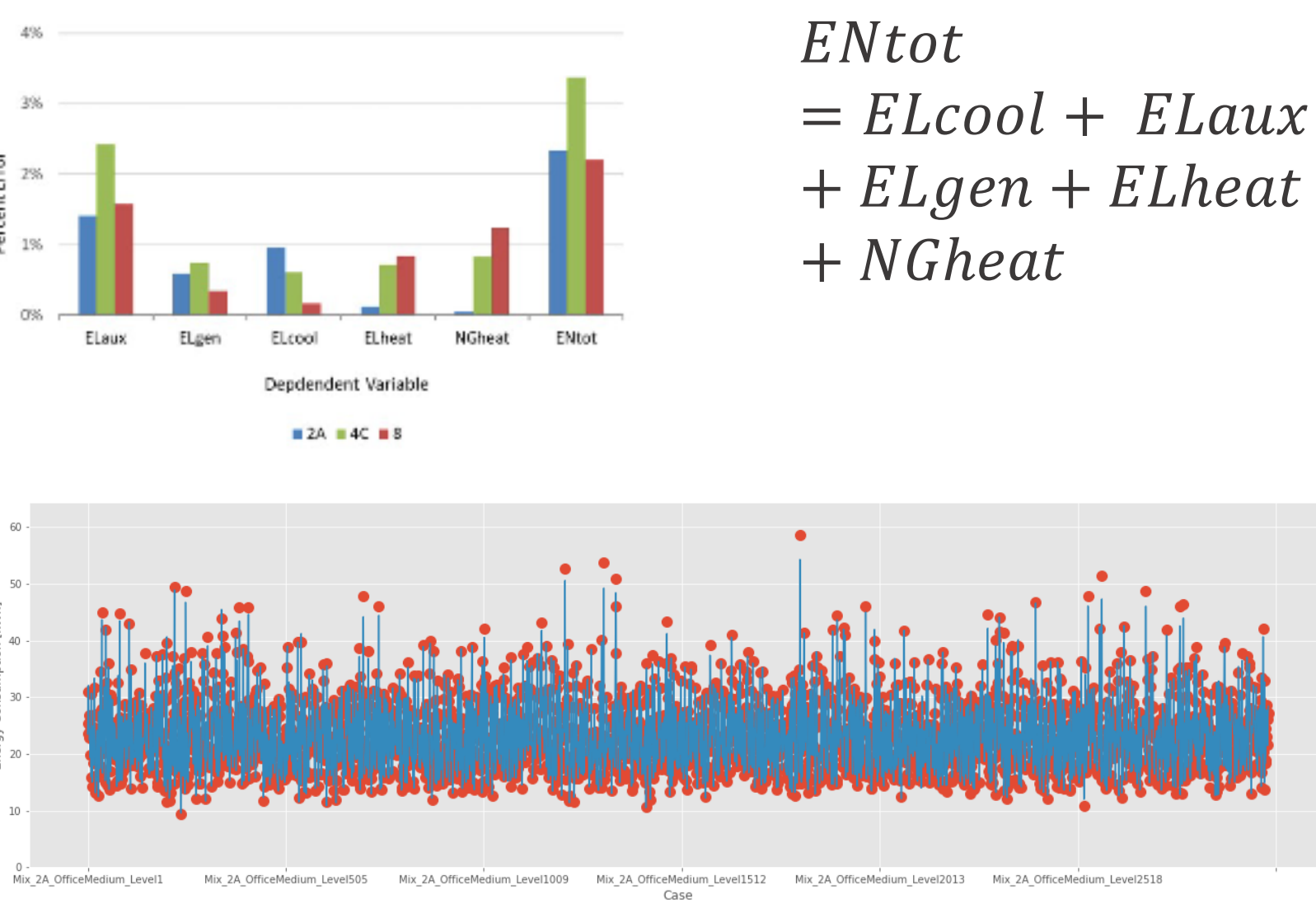
II. Model Specification – building energy simulation to capture individual and interactive energy impacts – Latin hypercube sampling algorithm- 3000 simulations.



III. Regression Development multi-variate polynomial regression coefficient sets for each combination of climate zone, building type, HVAC system type.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_m x_m + \beta_{11} x_1^2 + \beta_{22} x_2^2 + \beta_{mm} x_m^2 + \beta_{12} x_1 x_2 + \beta_{mn} x_m x_n$$

IV. Model Development & Validation feature selection and training



V. Web-tool Development integration of regression model and front-end web architecture

