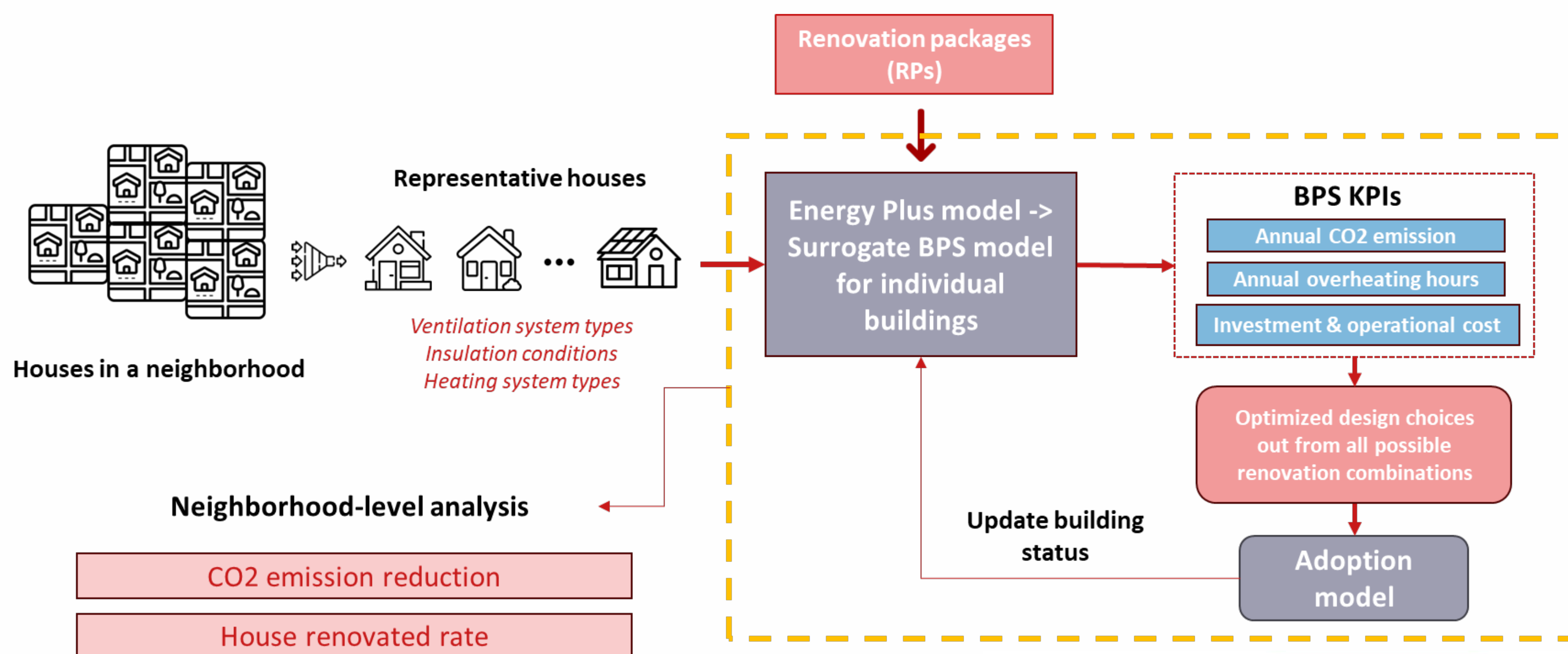


# Neighborhood Building Renovation Design Optimization: Combining Building Performance and Decision-Making Simulations

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## Introduction

The current renovation designs rely on technical, economic, and environmental analyses, often overlooking the vital influence of social stakeholders, such as homeowners and homeowner associations, who have the authority to approve or reject any renovation design. Our research project bridges the gap between detailed building performance assessments and occupant decision-making about investing those retrofit designs.

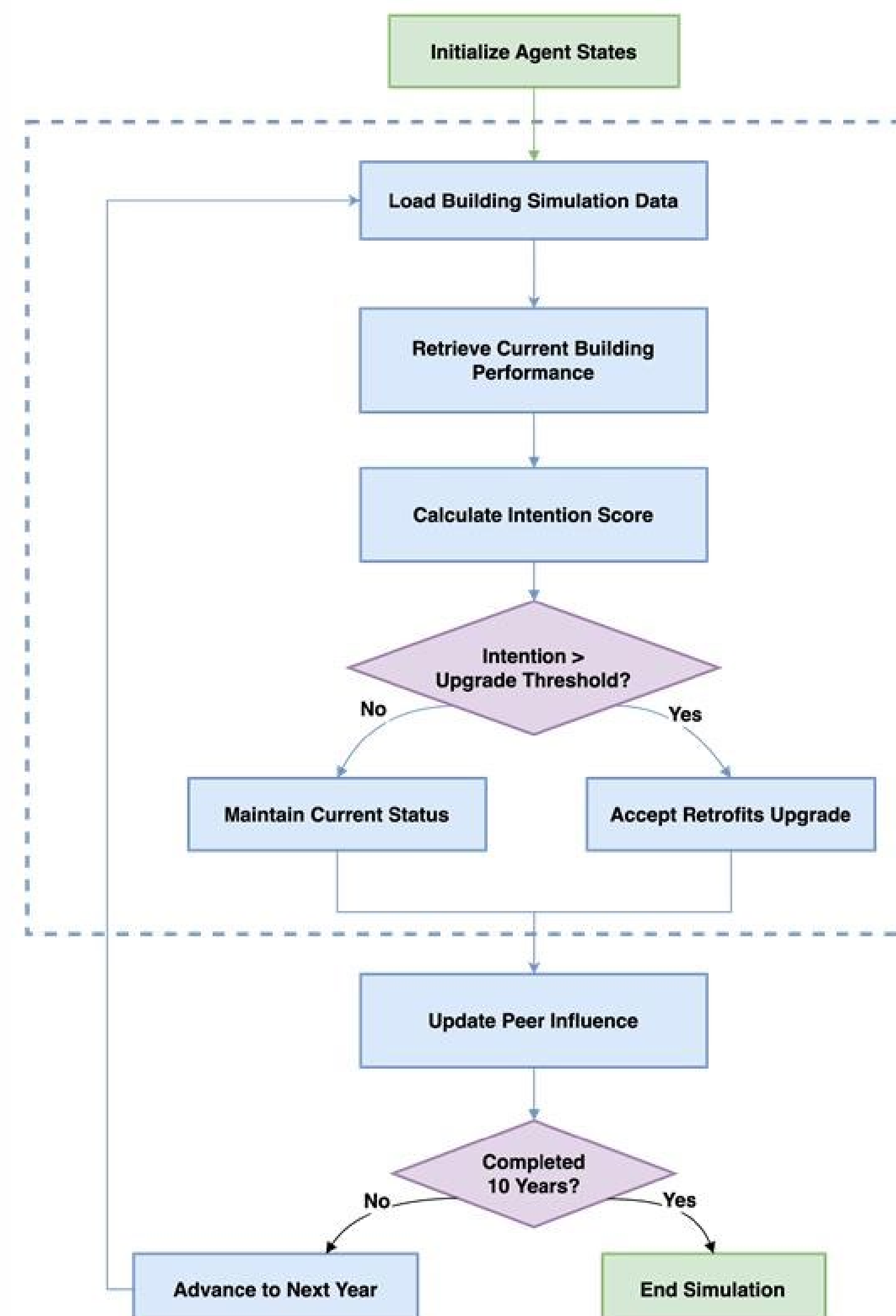


## Methodologies

- **Building Performance simulation:** Generate the fast building performance simulation model by developing the surrogate building simulation model.
- **Agent-Based Decision-Making:** These simulation outputs inform household-level agents using the Theory of Planned Behavior (TPB)

## Main Contributions

- Combines agent-based decision-making modeling with a surrogate building performance simulation.
- Captures retrofit adoption over time through dynamic iterations, including peer effects and feedback loops.
- Quickly assesses energy savings, comfort, CO<sub>2</sub> reduction, and economic trade-offs.
- Optimizes renovation strategies for diverse building types to inform effective policy decisions.



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