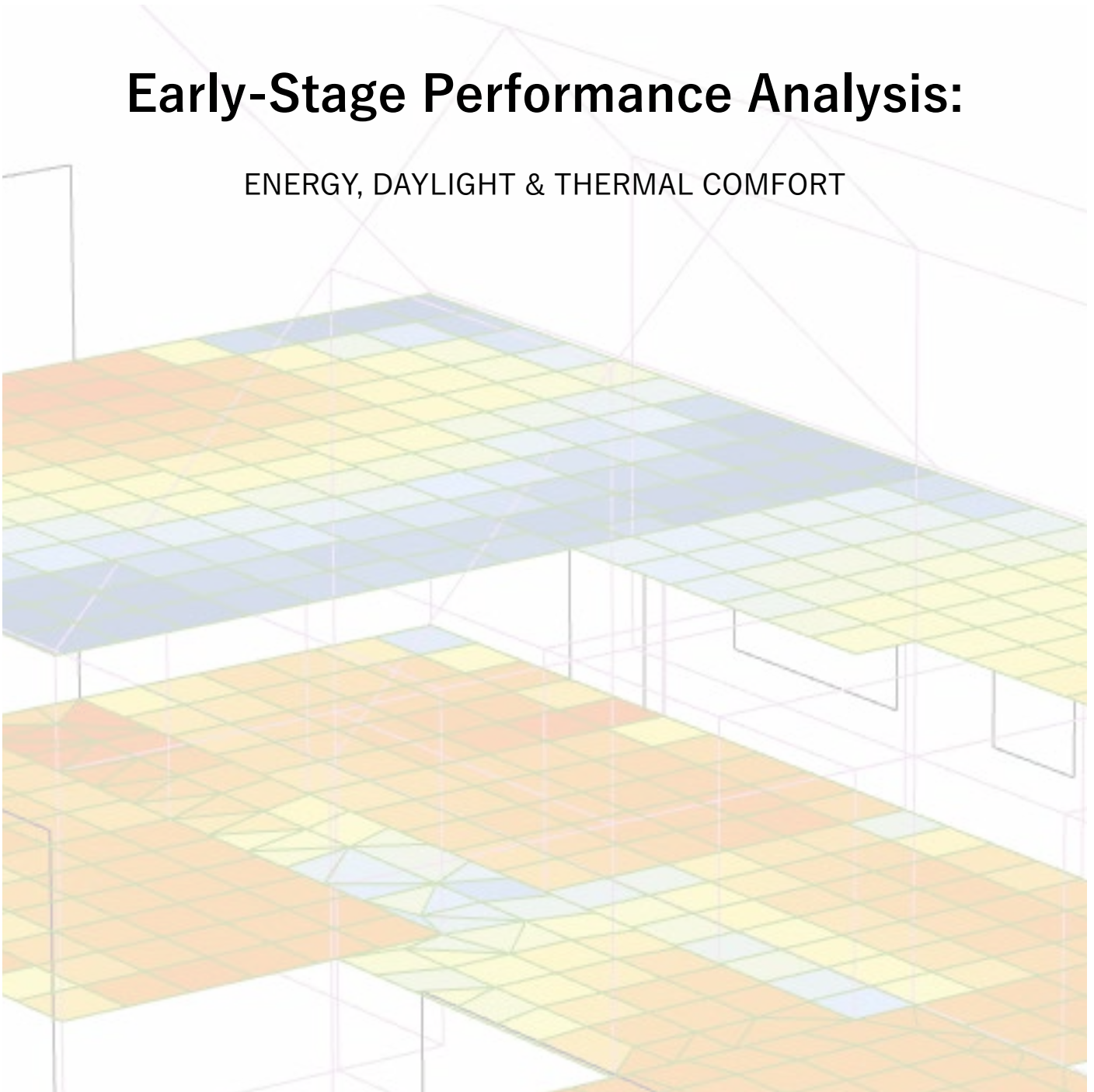


SERVICES OVERVIEW

Early-Stage Performance Analysis:

ENERGY, DAYLIGHT & THERMAL COMFORT



Why Early-Stage Analysis?

A building's long-term comfort and efficiency are decided during its first design sketches. Small, early choices- orientation, window placement, insulation... compound into outcomes that are expensive or impossible to reverse later.

Early-stage performance analysis tests architectural options while the design is still flexible, giving the design team clear, data-driven input before decisions are locked in.

1. Prevent Undesired Outcomes

Identify and eliminate dark zones, glare, and thermal discomfort while changes are still straightforward and cost-free.

2. Understand Trade-offs

Weigh architectural intent against measurable performance — with numbers, not assumptions.

3. Invest Where It Matters

Avoid over-engineering the wrong elements. Allocate budget to envelope upgrades and systems that produce real returns.

How It Works?

Before any simulation is run, we build a digital model of the project — a structured representation of the building where geometry, materials, climate data, and occupancy patterns are translated into simulation inputs. This groundwork determines the accuracy of everything that follows.

The tools used are Rhino and Grasshopper, with the Ladybug and Honeybee plugins, running on OpenStudio (EnergyPlus) and Radiance engines — industry-standard software used in professional engineering practice.

List of Services

1. Sun, Shadows & Site Analysis

1.1 Sun Path & Ideal Orientation Study:

Simulating annual solar paths to determine the optimal building angle that maximizes natural winter heat gains and eliminates permanently cold zones.

1.2 Façade Solar Radiation Mapping:

Measuring the exact solar energy hitting every square meter of the walls and roof to identify surfaces with the highest potential for free passive heating and photovoltaics potential.

1.3 Contextual Shading Assessment:

Modeling surrounding buildings, terrain, and vegetation to analyze when external elements block sunlight, enabling a smarter and more efficient layout of interior spaces.

2. Natural Light & Visual Comfort

2.1 Annual Natural Light Availability Mapping:

Calculating the percentage of annual hours where spaces receive sufficient daylight for daily activities, allowing us to identify and correct dark zones prior to construction.

2.2 Useful Daylight Distribution Analysis:

Mapping interior spaces to achieve a well-balanced distribution of natural light—avoiding both under-lit and oversaturated areas—to ensure visual comfort without eye strain.

2.3 Glare & Overexposure Risk Detection:

Identifying specific locations and timeframes when direct sunlight penetrates too deeply, helping prevent uncomfortable reflections on screens in living areas or home offices.

2.4 Smart Window Sizing & Position Optimization:

Testing various window dimensions and placements to maximize light availability where needed while avoiding oversized northern glazing where heating energy leaks.

List of Services

3. Energy Performance & Insulation

3.1 Energy Breakdown Chart & Demand Analysis:

Generating an energy breakdown chart that illustrates the baseline energy needs (demands) for heating, cooling, equipment, and lighting.

3.2 Room-by-Room Energy Performance Insights:

Analyzing the individual thermal behavior of each room based on its layout and geometry to pinpoint and optimize specific zones that drive up heating demands.

3.3 Insulation & Material Scenario Testing:

Simulating multiple envelope options (from baseline codes to premium insulation and triple glazing) to demonstrate relative energy savings and guide cost-effective material selection.

4. Indoor Comfort & Climate Adaptation (Thermal Comfort)

4.1 Thermal Comfort Conditions Assessment:

Testing and determining the specific operational conditions under which the house will achieve optimal thermal comfort, allowing us to avoid early design decisions that could result in reduced indoor comfort.

4.2 Preliminary Shading & Louver Effectiveness Testing:

Evaluating the performance of different shading types, louvers, and architectural overhangs to select the optimal strategy for mitigating seasonal overheating while allowing beneficial winter sun zones.