



KOHLER RONAN

HOW TO READ AN ENERGY MODEL



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LEARNING OBJECTIVES

- Discuss how performance **simulations can effectively inform design decisions** throughout each phase of the design process
- **Identify key design team conversations and analysis strategies** to avoiding common modeling errors
- **Compare & contrast the three most common types of modeling** [design performance, building energy, & building operational]
- Review the **core components of an energy modeling report**, including key definitions, inputs, assumptions and results

INTRODUCTION & CONCEPTS

WHAT IS ENERGY EFFICIENCY?

Using less energy to do more!

SIMPLE

- Using LED lights vs CFL vs incandescent
- Energy star appliances
- Insulation
- Daylighting

WHAT IS ENERGY EFFICIENCY?

Using less energy to do more!

COMPLEX

- Heat recovery or heat exchange
- Distribution systems
- Central plants
- Architectural programming
- Controls

DRIVERS OF ENERGY MODELING?

- Energy codes such as IECC & ASHRAE 90.1
- State and city energy mandates such as Local Law 97
- Green building rating systems such as LEED, Living Building Challenge, Passive House
- Architecture 2030, University Presidents Challenge
- Stakeholders

WHAT IS AN ENERGY MODEL?

In its simplest form, an energy model is a **calculation engine** that accepts **inputs** such as building geometry, system characteristics, and operating schedules, and produces **outputs** such as performance comparisons and compliance reports. - **AIA**

INPUTS

Project Specifications:

location, form, size, orientation, materials, lighting, power, service hot water, conveyance, renewable energy, and HVAC systems

Operational Assumptions:

weather, program, occupancy, and usage patterns

OUTPUTS

Energy:

demand, consumption, cost, by end use, by fuel type, savings

Performance:

carbon, water, thermal comfort, luminance/illuminance/glare

MODELING LANGUAGE

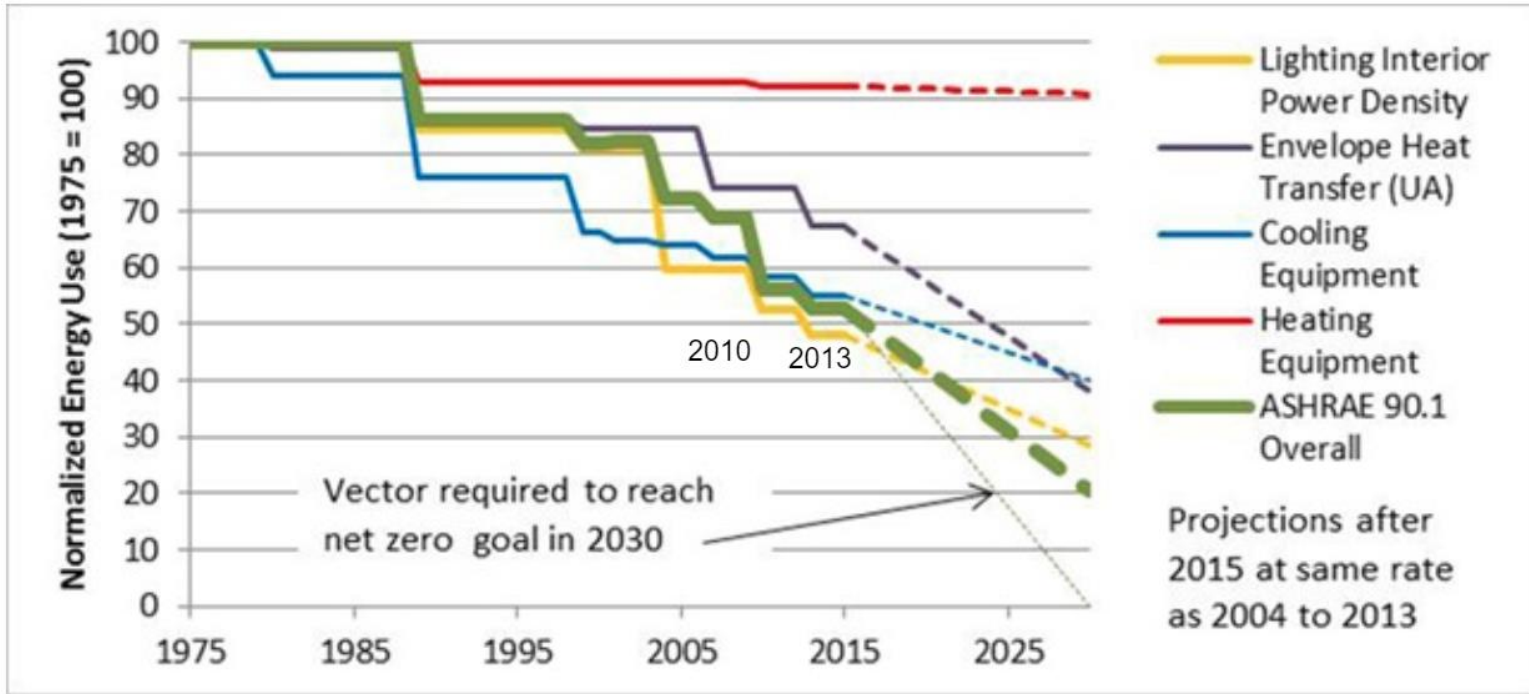
- Decision Making
- Testing
- Validation
- Sensitivity
- Relative Performance
- Prediction
- ~~Accurate Results of Actual Performance~~

BASELINE

Minimum information requirements

- Climate Zone
- Building Area
- Number of Floors
- Usage Type
- Utilities

BASELINE



Performance gap between Baseline and High-Performance Design is shrinking

DESIGN ASSISTANCE

ENERGY IN BUILDINGS

