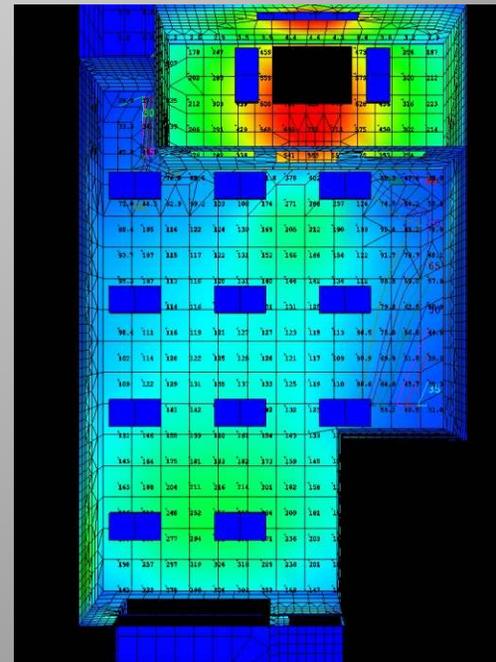
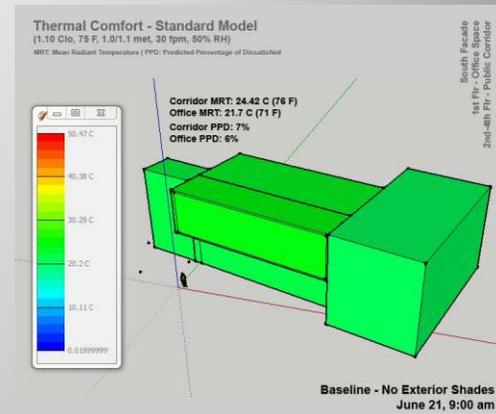


Conceptual Energy Analysis & Performance Analysis

Introduction



Agenda

- Introduction
- Conceptual vs Detailed
- Process
- Tools
- Conclusion

Introduction

- Energy modeling.....

What comes to your mind first?

Introduction

- Energy/Performance is
 - A design topic
 - Not a technology topic
 - Not a mechanical engineer's problem
 - About understanding physics, materials, enclosure and comfort

Architects, YOU are responsible!
2030 Commitment – remember?

Introduction

- Do you ask
 - How much energy your building design will consume?
 - How comfortable for the end users will the spaces be?
- We don't validate
 - Energy
 - Performance

Introduction

- Validate what?
 - Aesthetics
 - Code compliance
 - Budget
 - Construction schedule

Why not energy and performance?

Introduction

- Energy
 - Yearly utility consumption
 - Peak demand
- Performance
 - Visual comfort
 - Thermal comfort
 - Air quality comfort
 - Acoustic comfort

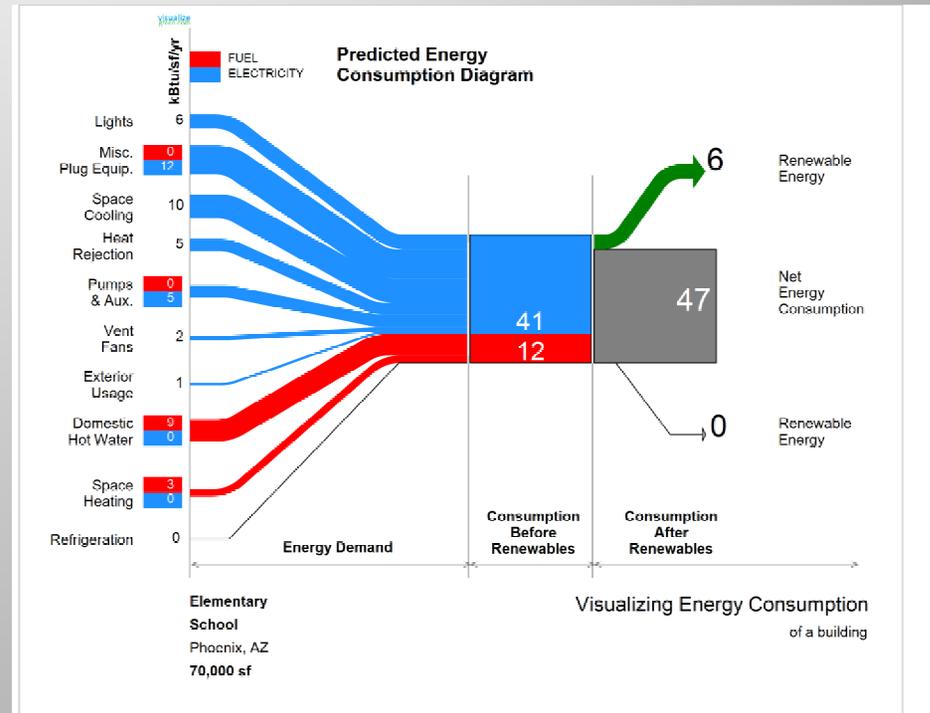
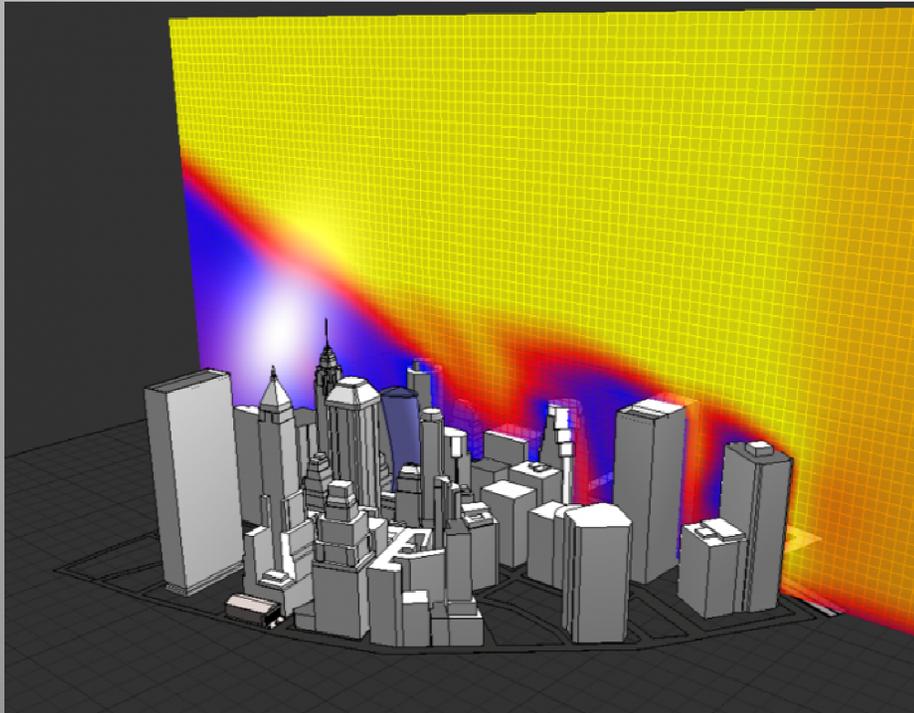
Do YOU validate any
of this on your
project?

Introduction

- Ultimate goal
 - Lowest energy consumption
 - Lowest peak demand
 - At most comfort
- Benefits
 - Not just a plaque on the wall
 - Less liability - Good design
 - Reduce redesign efforts

Not just being environmentally friendly – this is a business imperative – good business!

Conceptual vs Detailed



Conceptual vs Detailed

- Conceptual
 - To inform design
 - Form
 - WWR
 - Fenestration
 - Thermal R-values
- Detailed
 - For compliance
 - LEED
 - Title 24
 - CHPS
 - IECC
 - 2030 Challenge

Conceptual vs Detailed

- Conceptual

- Who

- Architects

- Detailed

- Who

- Architects
 - Engineers
 - Energy Modelers

Conceptual vs Detailed

- Conceptual
 - Time required
 - Can be rolled into design time
- Detailed
 - Time required
 - Requires additional service fee

Conceptual vs Detailed

- Conceptual
 - What to model
 - Test individual components / spaces
 - Example - one classroom, one office bay, one cell
- Detailed
 - What to model
 - Whole building energy model
 - Include lighting, envelope, mechanical

Conceptual vs Detailed

- Conceptual
 - Outcome
 - Performance metrics
 - Validate design
 - Caution
 - Do not guarantee performance
 - Lot of variables
- Detailed
 - Outcomes
 - Predicted energy consumption
 - Compliance achievement
 - Caution
 - Do not guarantee energy consumption
 - Lot of variables

Process

Now, how do we do this?

Process

- Take responsibility
- Ask energy/performance questions
- Set metrics
- Validate design
- Tell the story

Process

- Approach
 - Take responsibility / Ask questions
 - Through out the process
 - Set metrics / Validate
 - Conceptual design stages
 - Tell the story
 - Construction documentation and post occupancy stages

Process

- Energy
 - Yearly utility consumption
 - Peak demand
 - Performance
 - Visual comfort
 - Thermal comfort
 - Air quality comfort
 - Acoustic comfort
- Take responsibility
 - Ask questions
 - Set metrics
 - Validate design
 - Tell the story

Process

- Energy
 - Yearly utility consumption
 - Peak demand
 - Performance
 - Visual comfort
 - Thermal comfort
 - Air quality comfort
 - Acoustic comfort
- Example – Kings County Courthouse
 - Energy
 - 30% reduction
 - ICE storage tanks
 - Performance
 - Reduced Glare
 - Less than 20% dissatisfied

Process

Can we do all of this on every project?

– No

Process

- Proposal
 - Do ONE thing exceptionally well on every project
 - Ask the right question
 - Set metrics
 - Validate design
 - Tell the story
- Energy
 - Yearly utility consumption
 - Peak demand
 - Performance
 - Visual comfort
 - Thermal comfort
 - Air quality comfort
 - Acoustic comfort

Tools

What do we need to learn?

Tools

- Past
 - Hand calcs
 - Few design iterations
 - Lots of factor of safety
 - No requirement to validate
- Today and Future
 - Simulation tools
 - Multiple iterations possible to optimize – “right size”
 - Codes and standards will mandate

Tools

- Geometry / UI
 - Physical characteristics of the space
 - Properties of the components
 - User interface
- Simulation engine
 - Behind the scenes
 - Crunches all the numbers
 - Uses proven algorithms
 - Allows for multiple design iterations

Tools

- Geometry / UI
 - Sketchup
 - Revit
 - Excel
 - AutoCAD
- Simulation engine
 - IES VE
 - DOE-2
 - Energyplus
 - Radiance
 - Trane Trace

Tools

- Need
 - Learn multiple programs for different questions
- Hope
 - One program easy enough to use that will do all

- Energy
 - Yearly utility consumption
 - Peak demand
- Performance
 - Visual comfort
 - Thermal comfort
 - Air quality comfort
 - Acoustic comfort

Tools

- Conceptual Performance Analysis

- Visual
 - SPOT
 - AGI 32
- Thermal
 - Open Studio
 - Opaque
- Air Quality
 - Vasari
- Acoustic
 - Ecotect

- Conceptual Energy Analysis

- eQuest
- IES VE

Conclusion

Are you convinced yet?

Business Imperative

- Energy Codes will mandate energy modeling
- Growing field of Energy Modelers
- Cannot be another lost opportunity
- Architects, take ownership!
- This journey is going to require
 - Technical understanding – no way around this!
 - Learning new terminologies