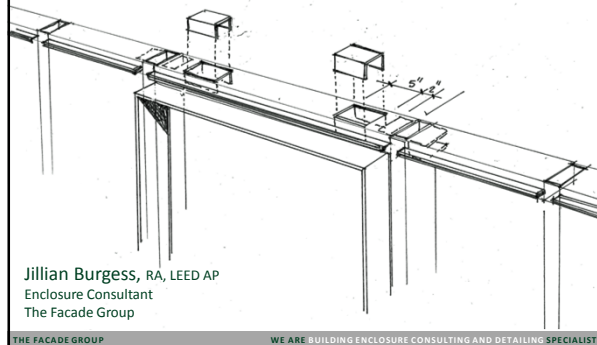


## An Architect's Guide to Early Phase Performance and Energy Modeling



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Questions related to specific products and services may be addressed at the conclusion of this presentation.

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### Course / Learning Objectives

Understand the overlap of enclosure related building performance modeling with mechanical energy modeling in early phase design.

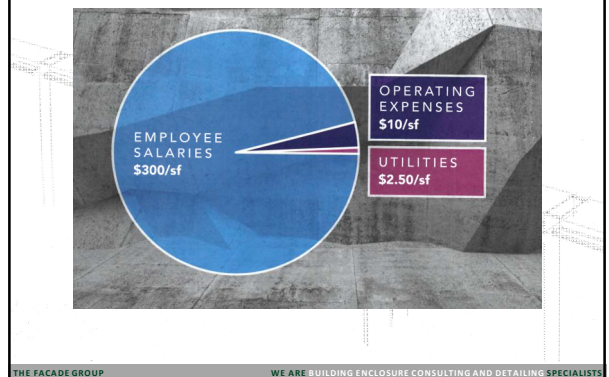
Identify where comparative studies can be done to better inform the whole building energy model to increase the speed of feedback

Identify an array of modeling methodologies to assist in early phase building energy and performance modeling.

Describe the value created by integrating building performance modeling into the decision making process for projects

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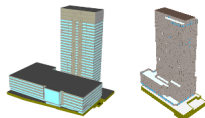
### Building Owner's Perspective



## Types of Modeling

### Comparative

Understand relative value of various options



### Predictive

Establish expectations for actual consumption



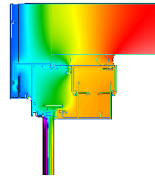
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## Types of Modeling

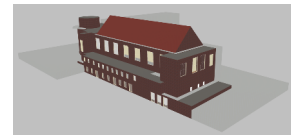
### Component

Individual systems



### Whole-building

Integrates all systems



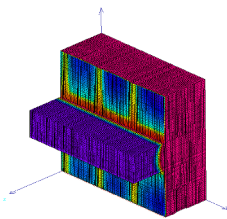
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## Types of Modeling

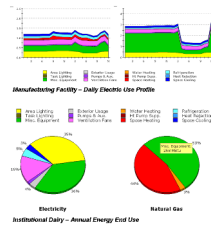
### Steady State

Instantaneous energy flows



### Annual

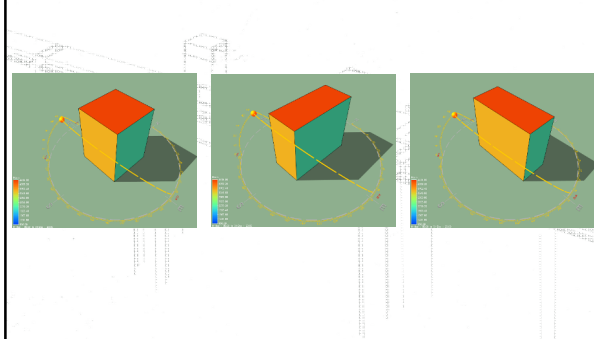
Totalized energy flows



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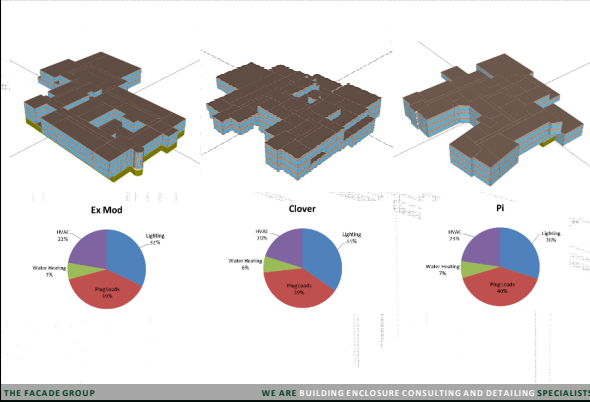
## Early Design: Massing



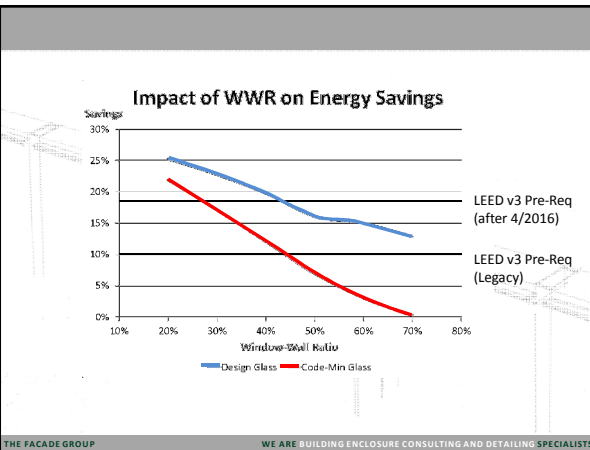
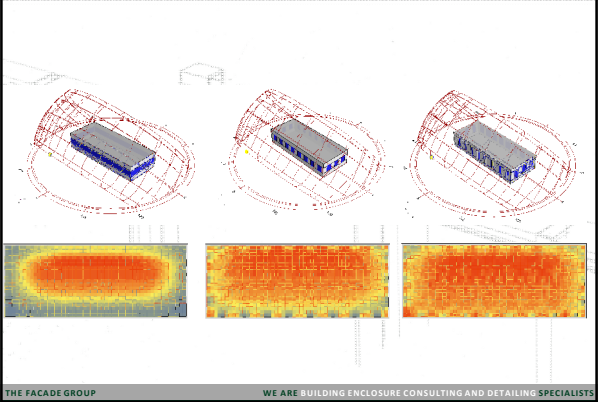
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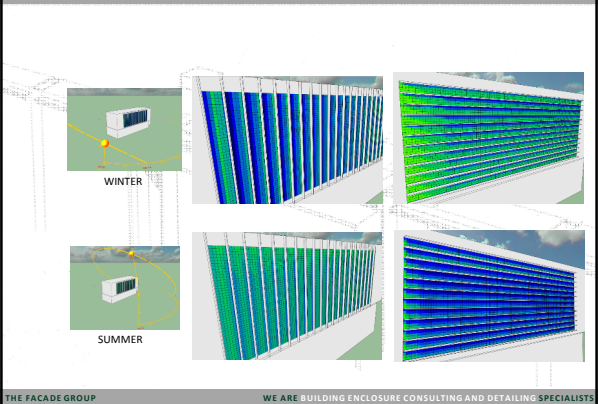
### Early Design: Massing

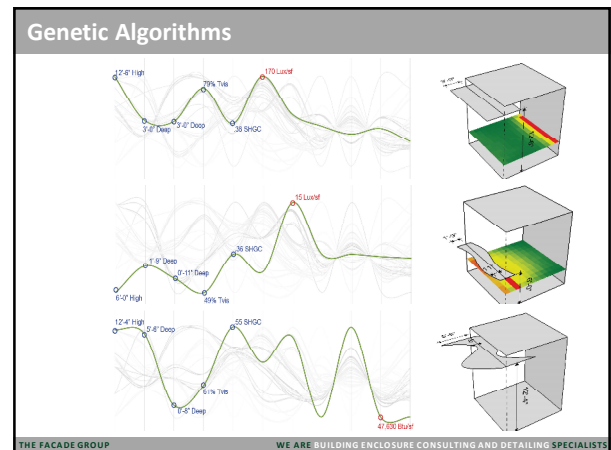
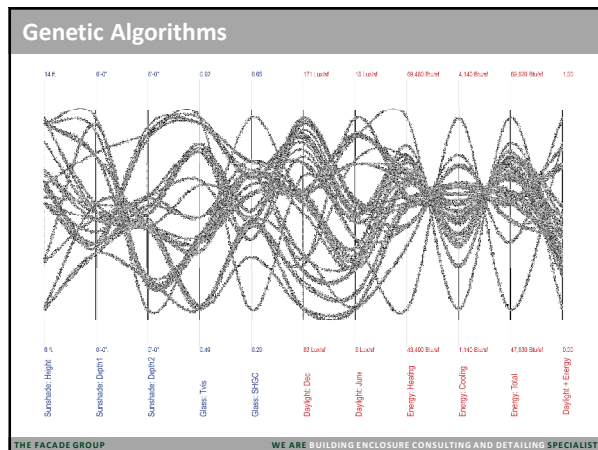
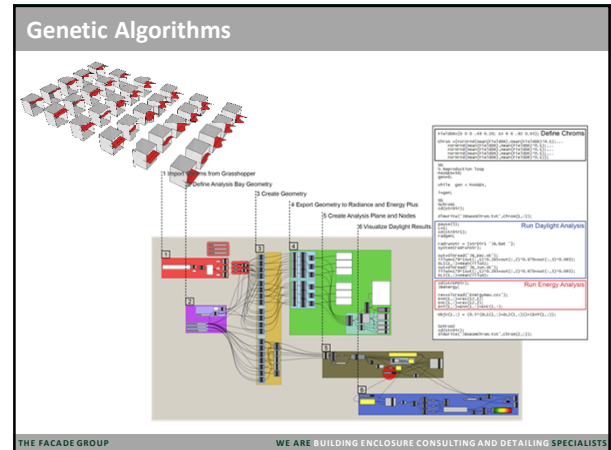


### Early Design: Window/Wall Ratio

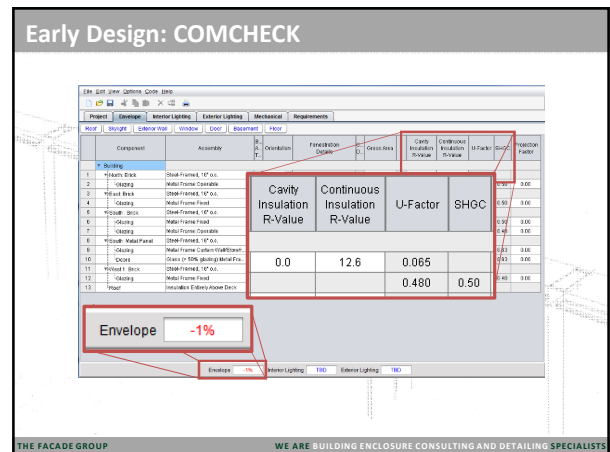
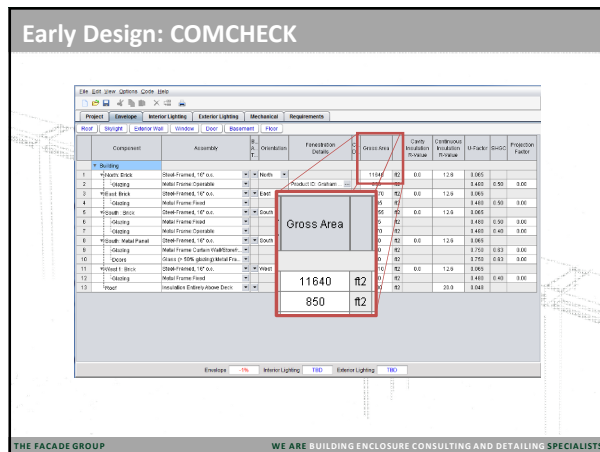
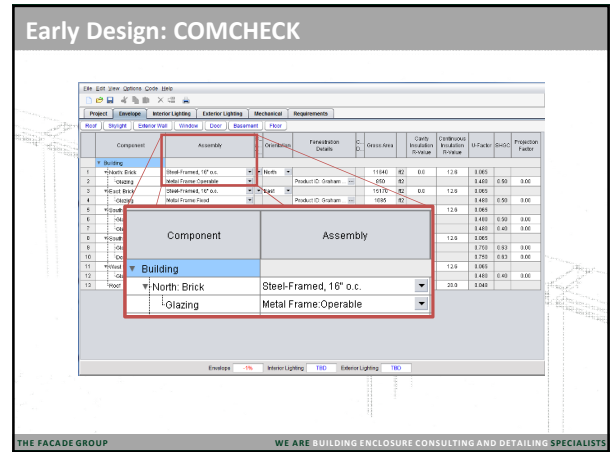
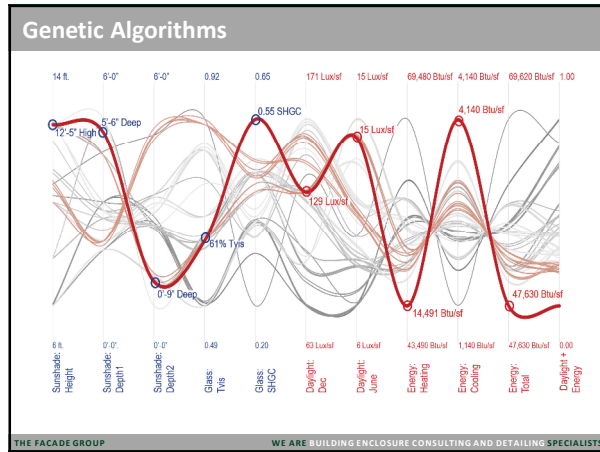


### Optimize Solar Gains/Shading

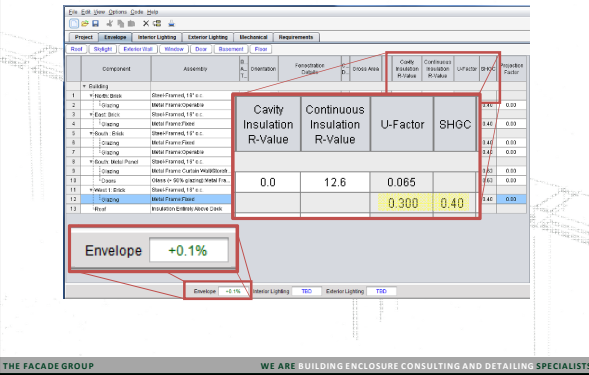




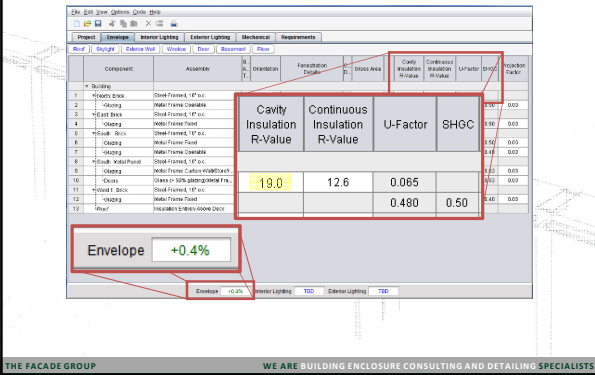




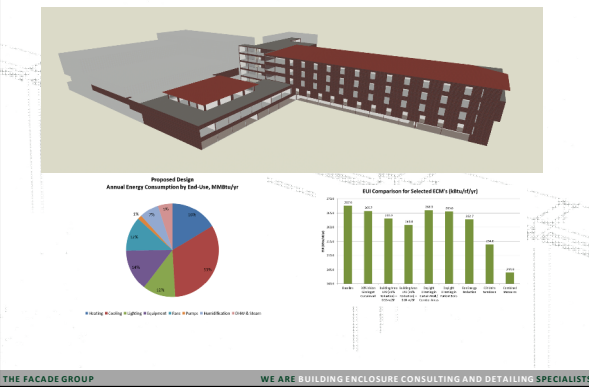
### Early Design: COMCHECK



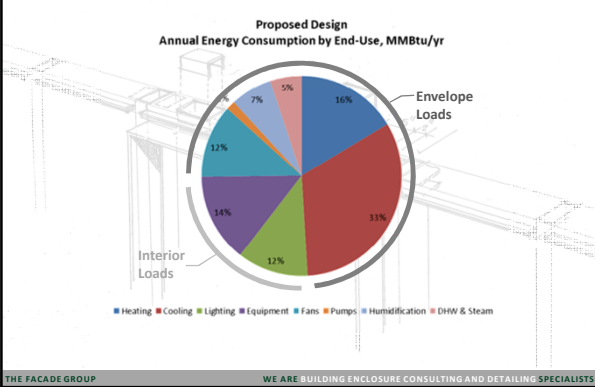
### Early Design: COMCHECK



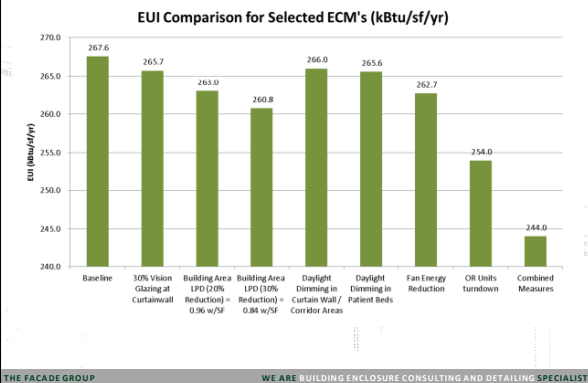
### Early Design: ECM Targeting



### Early Design: ECM Targeting



## Early Design: ECM Targeting



## Optimization: Offices



Philadelphia Naval Business Center

1,200 acres  
7,500,000 sf

>12,000 jobs  
LEED Silver min for NC

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## Optimization: Offices



### Target Early

- Set Component Targets

### Model Mid-Design

- Validate Goals

### Model at Bids

- Tension between Cost and Performance
- Balance via iterative modeling during bidding

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## Optimization: 201 Rouse Blvd

Location: Philadelphia, PA  
Owner: Liberty Property Trust  
Architect: DIGSAU  
Contractor: Turner Construction

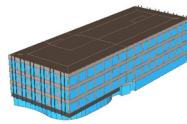


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### Optimization: 201 Rouse Blvd



80,050 sf  
LEED Gold (2015)



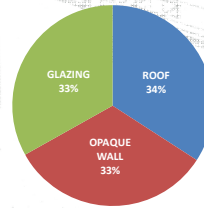
15% energy savings  
51% WWR

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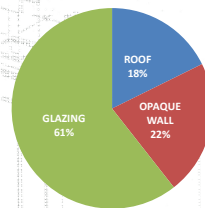
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### Exterior Envelope

Exterior Envelope by  
AREA



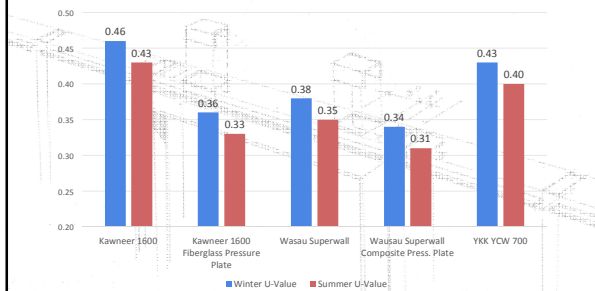
Exterior Envelope by  
LOADS



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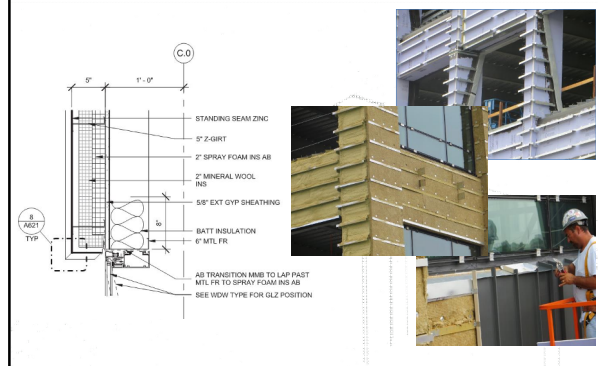
### Glazing and System Selection



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### Thermal Modeling: Continuous Insulation



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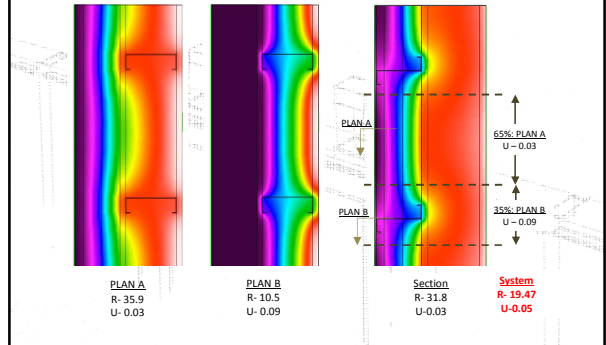
### Continuous Insulation?



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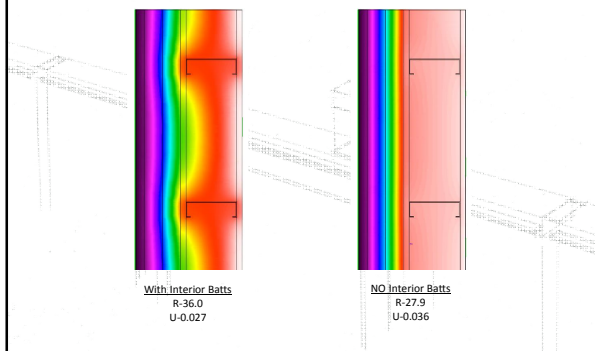
### Thermal Modeling: Area Weighted Average



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### With and Without Batt Insulation

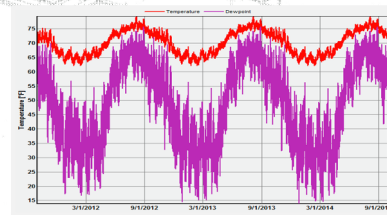


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### Hygrothermal Modeling

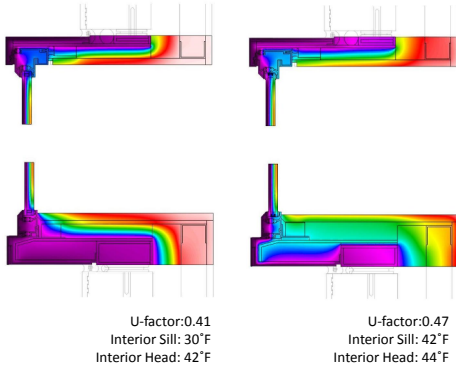
Temperature and Dew point vs. Time - Exterior face of WRB



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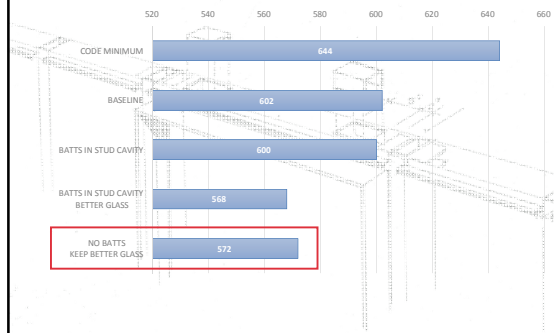
### Optimizing Insulation



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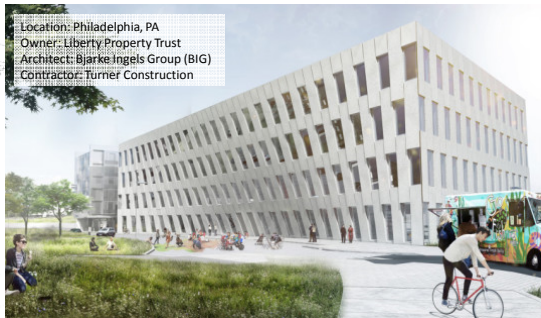
### Envelope Energy Loads



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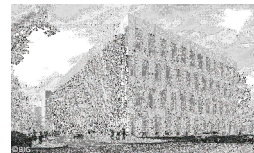
### Optimization: 1200 Intrepid Ave



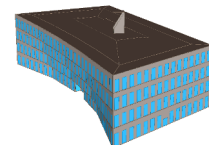
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### Optimization: 1200 Intrepid Ave



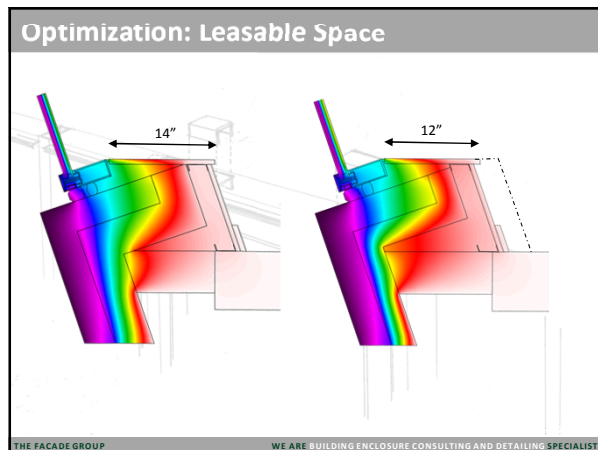
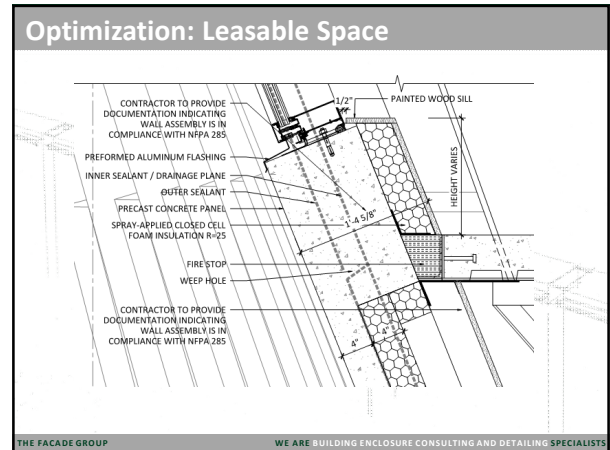
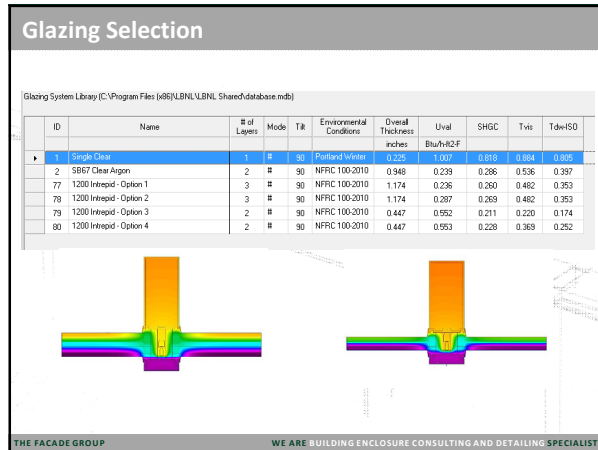
91,900 sf  
LEED Gold Pending



22% energy savings  
37% WWR

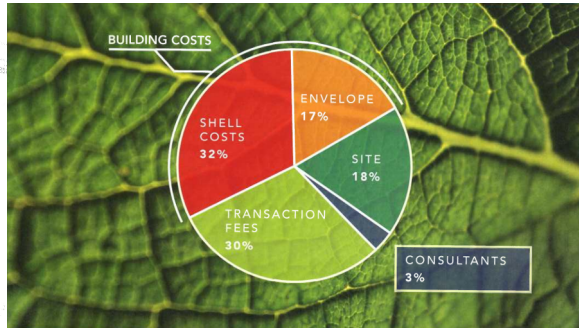
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## Building Owner's Perspective



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## Mockups



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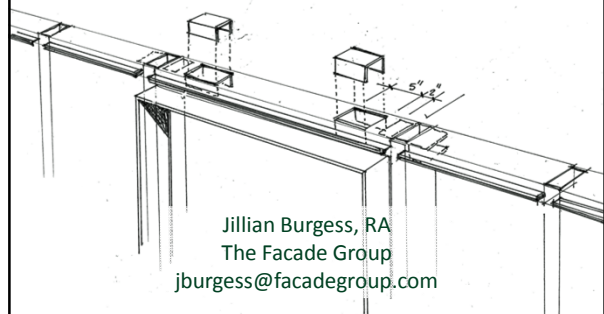
## Mockups



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## QUESTIONS?



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The Facade Group  
[jburgess@facadegroup.com](mailto:jburgess@facadegroup.com)

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