Energy Trust Net Zero Emerging Leaders Internship at CHA
NZEL EXPERIENCE AT CHA
Experience at CHA

2018
Developed an interest in Energy use modeling and environmental systems

January 16, 2019
Started at Carleton Hart Architecture as the NZEL Intern

March 7, 2019
In-House presentation and discussion of initial results

April 11, 2019
Energy Trust of Oregon / Design Week Portland Event
INSPIRING COMMUNITY THROUGH DESIGN
LaScala Apartments
A 44-unit residential building in Beaverton, Oregon. Earth Advantage Platinum certified.

Woody Guthrie Place
Currently under construction, this 64-unit mix of market rate and affordable housing in Portland’s Lents neighborhood is pursuing LEED® for Homes Mid-Rise Gold Certification.

Hill Park Apartments
2030 CHALLENGE
% GSF Energy Modeled

CHA

66.4% 33.6%

% Predicted EUI Reduction Increase

42.5%

AIA 2030 Program

54.1% 45.9%

35.2%

Energy Modeling
Reported Projects - Comparison to DDx Portfolio
Recorded Projects - Comparison to DDx Portfolio

Multi-Family Residential; North-America; United-States; Climate 4c.
Case Study: Rosewood Apartments

Comparison of Home Energy Rating Certificates. Predicted EUI for individual residential units.

Multi-building residential project with three buildings (1 new construction; 2 renovation buildings)
Plug Loads
Energy Demands
- Determined by user
- Determined by program type

Building Envelope
Energy Environment
- Massing, Form, & Orientation
- Exterior Cladding
- Window-Wall Ratio
- Shading Strategies

Mechanical Systems
Energy Consumption
- Heating & Cooling
- Ventilation
- Mechanical Equipment

Renewable Systems
Energy Generation and Supplementation
- Photovoltaic (PV) systems
- Solar Hot Water (SHW) systems
- Geothermal

Energy Design Factors
WORKFLOW
IMPLICATIONS
For Project Teams:
- Use the ZERO TOOL to set early energy targets!
- TRACK PROJECT DATA with Excel Template for DDx recording at end of each phase to streamline performance tracking.
- In-house project team ENERGY MODELING with Insight! Use the Automated Program Interface (API) to connect Insight projects directly to the DDx to simplify recording.

For CHA Sustainability Committee:
- ASSIST project teams throughout recording process at each design phase.
- REVIEW goals and performance with each project team at each design phases.
- UPLOAD annual portfolio via DDx batch upload by annual March 31st deadline.

<table>
<thead>
<tr>
<th>General</th>
<th>L. Input Building Specs</th>
<th>Project Name</th>
<th>Beatrix Morrow</th>
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<td>Residential - Mid-Rise/High-Rise</td>
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<td>Use Type 1</td>
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<td>73,668</td>
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<td>Use Type 3</td>
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<td>12,790</td>
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<td>Total Area</td>
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<td>Target Certification</td>
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NET ZERO EMERGING LEADERS:
Knowledge is Power

MADELAINE MURRAY | HENNEBERY EDDY ARCHITECTS
Hennebery Eddy Background
Net-Positive Design Philosophy
AIA 2030 Commitment

Design Data Exchange (DDx)
Influence on Firm
Using DDx as an Archive
Tools Beyond DDx

Globalization of Data
Net Zero Emerging Leaders Internship
Net-Positive Design Philosophy

Healthy | Efficient | Adaptive

Provide design solutions for buildings that result in a **positive impact** through efficient energy use, water consumption, and adaptive structures. Net-positive approach is the **foundation** of design decisions. **Knowledge** of how to achieve net-positive results is the **power**.
Net-Positive Design Philosophy
& Design Data Exchange:

2011
Partners w/ Energy Trust Oregon
New Buildings Trade Ally

2014
3 projects

2015
Hennebery Eddy Signs AIA 2030 Commitment
6 projects

2016
23 projects

2017
24 projects

2018
NZEL Internship Platform to share data
42 projects

Reporting Year / Reported Projects
Examples of Projects Meeting 2030 Target:

Yellowstone Youth Campus
108% Energy Use Intensity (EUI) reduction

Bend Science Station
100% Energy Use Intensity (EUI) reduction

Clackamas Fire Station 16
70% Energy Use Intensity (EUI) reduction
**DDx as the Archive:**

*Knowledge is Power*

Reporting and analyzing projects: **highlighting progress** and room for improvement.

By reporting basic information such as location, square footage, and Energy Use Intensity (EUI), the data is **more accessible** at a general level.

Design Data Exchange (DDx) has value with the firm, clients, and future generations.
Locating Our Firm:

Projects in the US 2014

% pEUI Reduction

Gross Floor Area (sf)

Projects in the US 2018

Gross Floor Area (sf)

Other Firms  Hennebery Eddy’s Projects

2015 2018
Net Positive Tools and the DDx:
Define project goals early for projects with a net positive focus: an eco-charrette to get the conversation started with clients.

DDx is a platform for documenting: encouraging energy modeling and a net-positive checklist throughout the design process.

Another resource: Energy Trust Oregon (ETO) offers incentive programs that offset costs to achieve design goals. This includes eco-charrettes, Path to Net Zero, & solar incentives.

How can historic preservation projects be recognized through DDx?
Gathering & Sharing Data:

AIA 2030 By the Numbers:

Outcome of Sharing Data:
Where we are locally.
Where we are globally.

Conversation between firms
Exchanging methods of energy modeling and documenting projects on DDx.

Henneberg Eddy Architects

Annual predicted energy use intensity (pEUI) savings is a weighted average of whole building project gross square feet (GSSF) pEUI savings relative to the 2030 Baseline. 2003 Commercial Building Consumption Survey (CEBES®) and 2001 Residential Consumption Survey (RECS®).
Net Zero Emerging Leaders:  
*Extending the Conversation*

Sustainability is not a race;  
Design Data Exchange is not a competition.

Encourages the philosophy of  
“knowledge is power”

Architects play a key role in combating climate change, nearly 40% of US energy is consumed by buildings (AIA).

Design Data Exchange is our way of  
“climate leadership” – how we can recognize where we are and where we are going.
Net Zero Emerging Leader Internship

Holst Architecture | Energy Trust of Oregon
Holst Architecture

Medium Sized Firm
40 Employees

Architecture 2030 Challenge
2017: 26 Projects
2018: 33 Projects
Agenda

Research

Reporting

Lessons Learned
Research
Why?

- Built environment is an energy intensive industry
- Design Energy (pEUI)
- Site Energy (EUI)
- Bake energy data into the design process
Best Practices

Tools for Architecture
- Sefaira
- Autodesk Insight 360
- EnergyPlus

Energy Data
- Post-occupancy
- High Performance Buildings
- Smart Grids
Holst Method

Challenges
• Not part of a process
• Requires a lot of work at the end of the reporting year

Goals
• Streamline reporting
• Incorporate into the design process
• Create a feedback loop
Reporting
Project Team Reporting

- Reporting Spreadsheet
- Project Team Meetings
- Data Cleaning
Architecture 2030 Reporting

*Cost Per Square Foot for internal use only.
*Have to manually enter Climate Zone, green section and gray section into DDx.
*If more rows are needed, go to the right bottom edge of the table, click and drag blue corner symbol down to add more rows.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project ID</th>
<th>Project Category</th>
<th>Construction Type</th>
<th>Project Phase</th>
<th>Country</th>
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<td>Jigme Singye Wangchuk Law Library(RI)</td>
<td>15-056.00</td>
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<td>Construction Administration</td>
<td>Other-Asia</td>
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<td>Construction Documents</td>
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<td>Major Renovation of Existing Building</td>
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Batch Upload

TIME SAVER

SEPARATE TEMPLATE

INTERNAL DATA
Design Data Exchange (DDx)

- Information challenges:
  - 3D Models
  - GMP drawings
  - Energy models
  - HVAC System information (ME)
## Data Analysis

<table>
<thead>
<tr>
<th><strong>DDx Data Report</strong></th>
<th><strong>Supplement to DDx</strong></th>
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<tbody>
<tr>
<td>• Percentages towards a goal</td>
<td>• Make the argument for sustainable designs</td>
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<tr>
<td>• Overall program performance</td>
<td>• EUI relative to:</td>
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<tr>
<td>• Assumption: already on board for sustainable buildings</td>
<td>• Design code</td>
</tr>
<tr>
<td></td>
<td>• Energy model</td>
</tr>
<tr>
<td></td>
<td>• Building type</td>
</tr>
<tr>
<td></td>
<td>• Materials</td>
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Lessons Learned
Approaches to sustainable design varies widely across the industry.

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<tr>
<th>Method</th>
<th>Process</th>
<th>Tool/Software</th>
<th>Implementation</th>
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</thead>
</table>

**Energy Data**

| Internal vs. External | Energy Modeling |
Working at Holst

- Community
- Project Site Visit
- Microbial Built Environment Speaker
- New HQ Charrette
- Green Team
Future Challenges

Design Energy and Site Energy
- Benchmarking
- Energy modeling

Information collection
- Design source energy
- Design CO2e intensity
- LCA/proxy
Next Steps

ENERGY, MATERIALS AND WATER

IN-HOUSE ENERGY MODELING

SUSTAINABLE DESIGN PROCESS
Thank You!
Net Zero Emerging Leaders Internship
Energy Use Intensity Feedback and Integration of Energy Modeling
Energy Trust of Oregon

Jessica Meylor
Zaq Dohallow, Amy Sheckla-Cox
I’m Jess...

and this is Otak.
Sustainability at Otak

Otak Signed the AIA 2030 Commitment in 2011
- Formed Green Otak (GO) Committee

**GO Operations**
- Office Energy Use
- Waste Reduction and Supplies
- Transportation

**GO Training**
- Promoting Staff Accreditation
  - LEED
  - WELL
  - ECO Districts
  - Envision

**GO Practice**
- Improving Design Process To Make “Greener” Work
- AIA 2030 Design Data Exchange
- Net Zero Emerging Leader (NZEL)
NZEL Internship Objectives

1. worked on energy modeling and analysis through Sefaira Architecture...

2. used troubleshooting techniques to understand and navigate best tool practices for optimal use...

3. contributed data to building performance feedback loop to better inform design...

4. established paths of integration and use for further energy modeling integration..
What is Energy Modeling?

**Energy Use Intensity (EUI)**

- **Energy**
  - Envelope Design
    - Facade Glazing
    - Walls
    - Floors
    - Infiltration
    - Roof and Roof Glazing
  - Daylighting Design
    - Visible Light Transmittance
    - Glazing
    - Work Plane Height

- **Daylighting**

- **Thermal Comfort**

- **HVAC Sizing**
  - HVAC Design
    - Design Air Flow
    - Cooling Coil Source
    - Heating Coil Source
    - Heat Recovery
Using Sefaira For Energy Modeling

Sefaira Architecture

- Explore design options and understand impacts on building performance
- Analyze building envelope, HVAC Systems and on-site renewable energy potential
- Test effectiveness of current or compared energy conservation strategies

Impacted Design Process Phases

- Project Win/ Kick Off; Concept Pre-Design; Design Development
Otak 2018 Portfolio
Oregon Projects

Through the AIA 2030 DDX, the primary building use types offer a look at Baseline EUI comparisons for projects and allows Otak to look at the diversity of our portfolio.

* Building Type Source from AIA 2030 DDX Firm Reported Levels
This mixed-use building on Northwest 12th and Flanders represents a new kind of sustainable design for hospitality and housing in Portland, informed and planned around elegant design challenges to comply with new building codes and the needs of a dynamic, developing city.
Energy Modeling Case Study: Hyatt Place Portland, Oregon

Development Phase
Use Type: Lodging - Hotel
199,801 Gross Square Feet
23 Floors

National Average EUI: 94.0 kBtu/sf/yr
Zero Tool Baseline EUI: 69.3 kBtu/sf/yr
AIA 2030 Goal EUI: 20.8 kBtu/sf/yr
Sefaira Predicted EUI: 18 kBtu/sf/yr

76% Percent savings for the project energy consumption
Energy Modeling Case Study: Hyatt Place Portland, Oregon

SketchUp Mass Energy Model  SketchUp Energy Model  Revit Energy Model
Results

For 2018, Otak submitted 41 project buildings, providing over 1,063,791 gross square feet of building envelope and energy analysis.

100% of our submitted projects were energy modeled using Sefaira.

Building analysis average reflects a 43.7% predicted EUI reduction in relation to the 70% reduction for the net zero challenge goal.
Integration of Energy Modeling at Otak

1. Early Communication and Planning
   - Sustainability Action Plan
   - MEP Team
   - Client

2. Standardize Practice within Design Process
   - Create and implement the use of designated energy modeling resources and sharing space

3. Create a Path to Assist Further Analysis
   - Data Driven Design
   - Building Performance Assessment for Comparison
   - Daylighting Analysis and Concept Stage
   - Climate Design Evaluation
   - Informed Energy Code Compliance
Speranza Architecture + Urban Design
The Firm

- Office of 6 located in Eugene, Oregon
- Firm led by Philip Speranza, AIA
- Multidisciplinary firm focusing on
  - Residential
  - Commercial
  - Master Planning
  - Urban Design
Our Commitment to the 2030 Challenge, and Ultimately, Better Buildings:

Buildings are a reflection of their spiritual makeup. By creating positive atmospheric experiences, our goal is not only to invest in the sustainability of a building, but also the development of sustainable behaviors.

At SA+UD we pledge to lead efforts towards the design of better buildings and aim to define how well-being in a building can amplify sustainable living.
Philosophy & Energy

Building Form

Big Move – Additive or Subtractive
Philosophy & Energy

Sustainable Strategy

Ecological Incorporation

Speranza Architecture + Urban Design

NZEL Internship
NZEL Internship

THEN

NOW

The Experience – The Future Impact From SAUD & Energy Trust
First-hand experience of presenting real data to a client and the impact it makes on their decision-making towards better buildings
Analysis on the front end of the design, partnered with our philosophy, helps us understand how the two can relate and allow us to make better buildings. We then can create a method of designing sustainable behaviors and make a better contribution to energy efficiency.
Sustainable Behaviors

What the analysis can do to inform the design decision, how it can teach and inform the client, and ultimately how it can teach the user about their contribution to energy efficiency.
Our Effort Towards Efficiency

Speranza Architecture + Urban Design

NZEL Internship