



# NET ZERO EMERGING LEADERS' INTERNSHIP

GBD ARCHITECTS | ENERGY TRUST OF OREGON

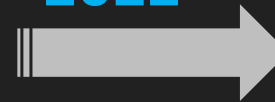
2022



2021



2022



AMBER ZEPEDA

2020

BENTLEY RAGER

- Draft internal standards of sustainable data collection
- Create an internal 2019 project sustainability catalog
- Report 2019 DDX project data

2021

MASON MARTINEZ

- Expand internal standards of sustainable data collection
- Merge project catalog with power-bi interface/generate GBD project dashboards
- Report 2020 DDX project data



LUCY SEMENOVA



**AMBER ZEPEDA**

**LUCY SEMENOVA**

**WORK PLACE:**

ONSITE, OREGON

REMOTE, ARIZONA

**EDUCATION:**

MECHANICAL ENGINEERING

ARCHITECT

**WORK PROCESS:**

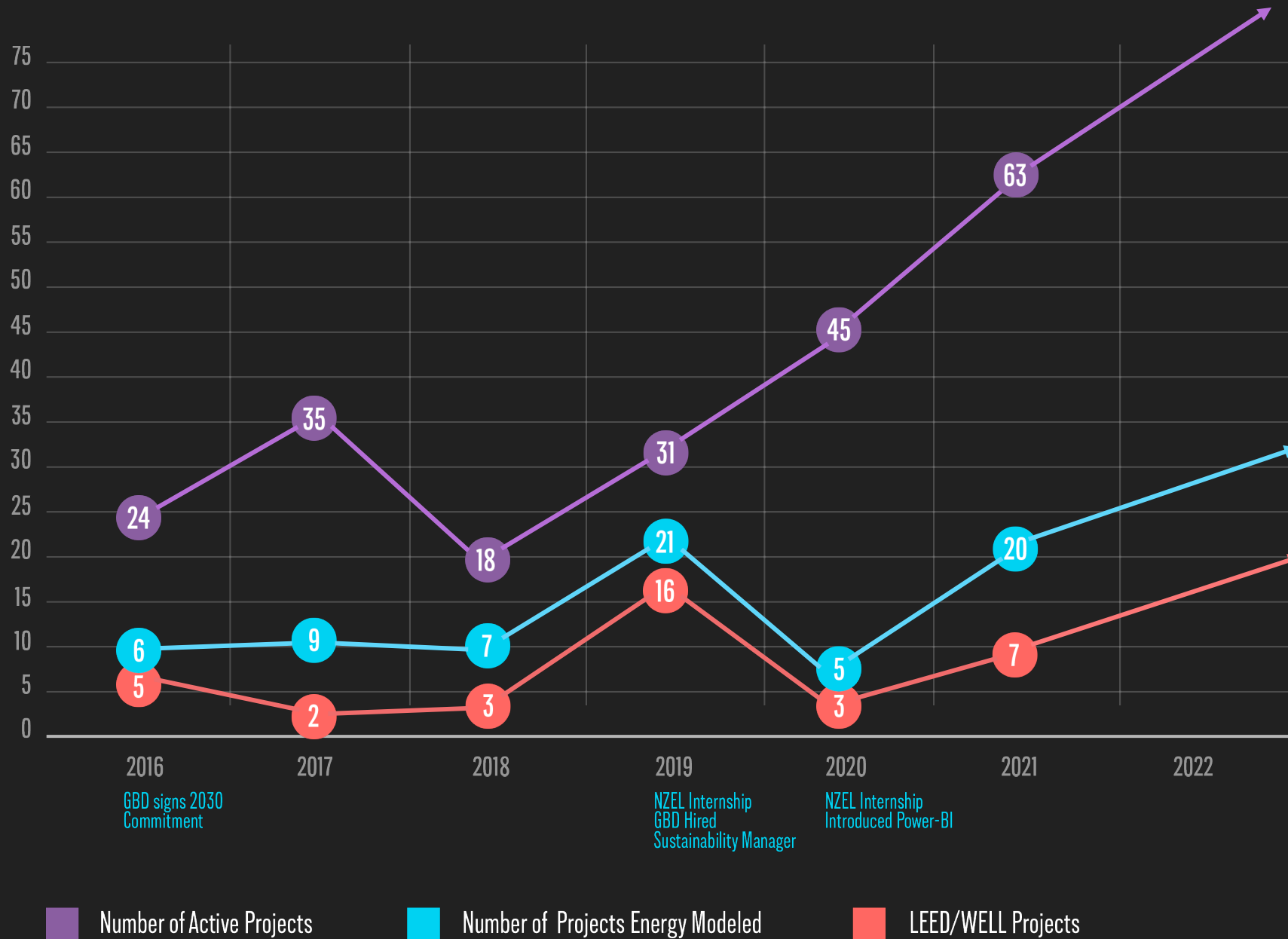
TEAMWORK

INDIVIDUAL

**GBD'S TASKS:**

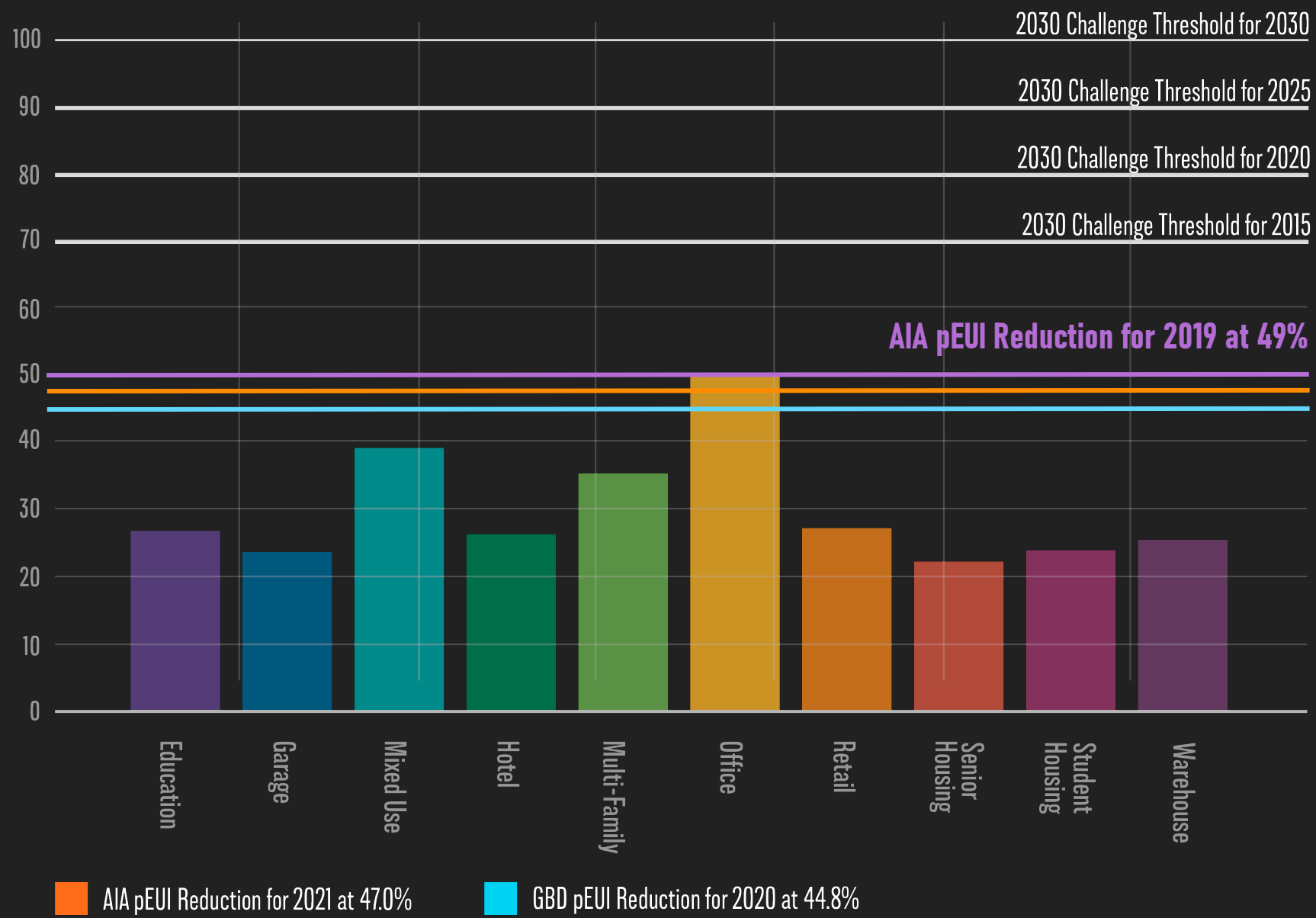
- COLLECTING DDX DATA
- CREATING DASHBOARD PLATFORM
- PYTHON CODING

- COLLECTING DDX DATA
- CREATING DESIGN CODE
- DESIGN DASHBOARD STYLE



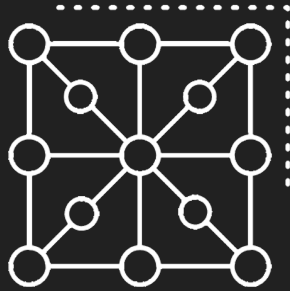


# PREDICTED EUI REDUCTION x GBD 2022 PORTFOLIO



# BACKGROUND CONTEXT

GBD



100+ PROJECTS DDX  
TRACKING

3,000+ DATA POINTS THAT  
NEED PERIODIC UPDATES



BIG INVESTMENT  
(HOURS)

NEEDED TO UPDATE &  
TRACK INFORMATION.



PORTFOLIO GROWS

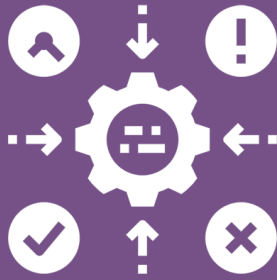
PORTFOLIO GROWS BY  
25-30 NEW PROJECTS  
EACH YEAR



BENEFITS OF HAVING  
GOOD DATA

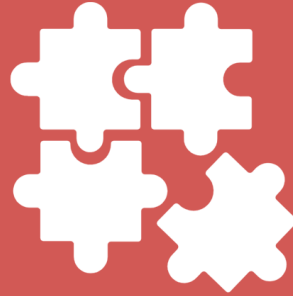
- UNDERSTAND HOW THE FIRM ARE DOING
- IMPROVE FIRM PROCESS
- IDENTIFY BEST / WORST PERFORMING PROJECTS
- MANAGE DATA OVERARCHING SUSTAINABILITY AND CLIMATE INITIATIVES

## CONTEXT



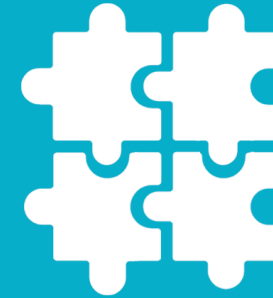
- Needed compelling ways to visualize data that is most conducive for designers
- Dashboard allow GBD to interactively visualize & filter data was conceived
- Mason (2021 NZELI intern) developed a framework for how those dashboards could be laid out and would function

## PROBLEM



- Initial plan was to utilize Microsoft's Power BI platform for developing our dashboard
- Due to enterprise license issues using Power BI became prohibitive

## SOLUTION



- Pivoted to developing dashboard using open-source Python code.
- Very powerful tool that will allow GBD to scale and tailor the way we work and visualize with data
- Continue to grow & influence other important sustainability topics such as embodied carbon, water use, high performing strategies and design level cost modeling

DDX 2030 DASHBOARD

Filter Panel

Location State:

Oregon

Building type:

Masterplanning

Completed year:



LEED projects

Pursuing	21
Certified	01
Silver	00
Gold	03
Platinum	01

0000060

Number of projects in OR +3%

0002531

Total number of projects +3%



GBD



DDX 2030 DASHBOARD PAGE

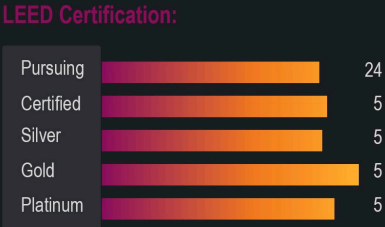
Filter Panel

Location State:  
Oregon (+)

Project type:  
Masterplanning (+)

Project phase:  
CD (+)

Completed year:  
2016 2020

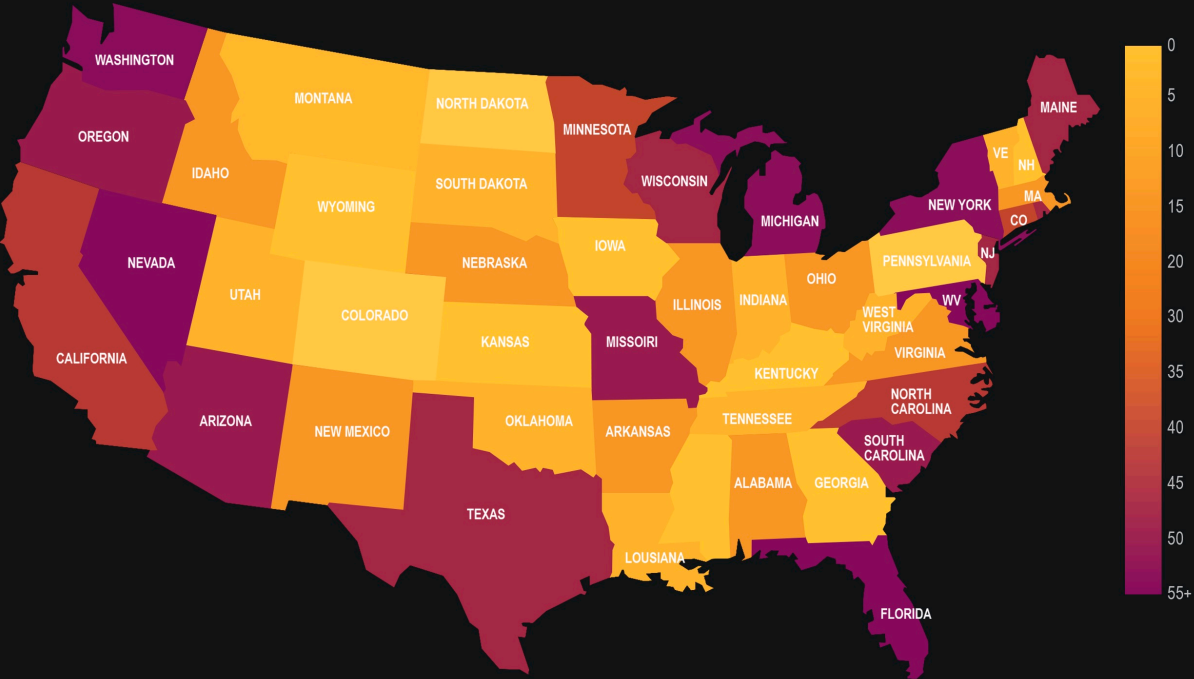


Submit and update

00000000  
Total number of projects +3%

GBD

00000000  
Total building GSF +5%



Avg pEUI  
(kBTU/sf/yr)  
24.30

Avg Energy Reduction  
(%)  
3.60 %

Avg Energy Reduction  
(%)  
3.60 %

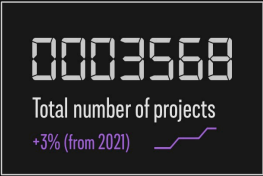
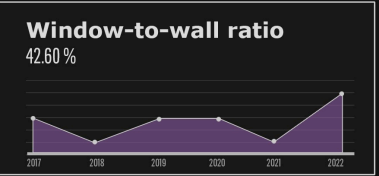
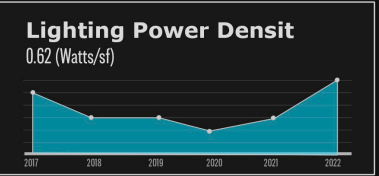
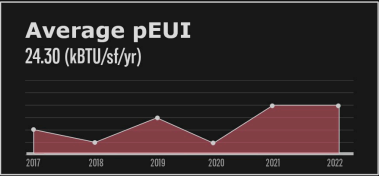
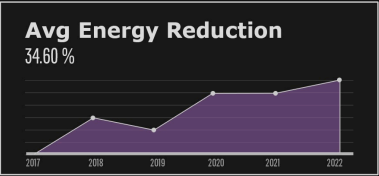
Project Info

Location City:  
Portland

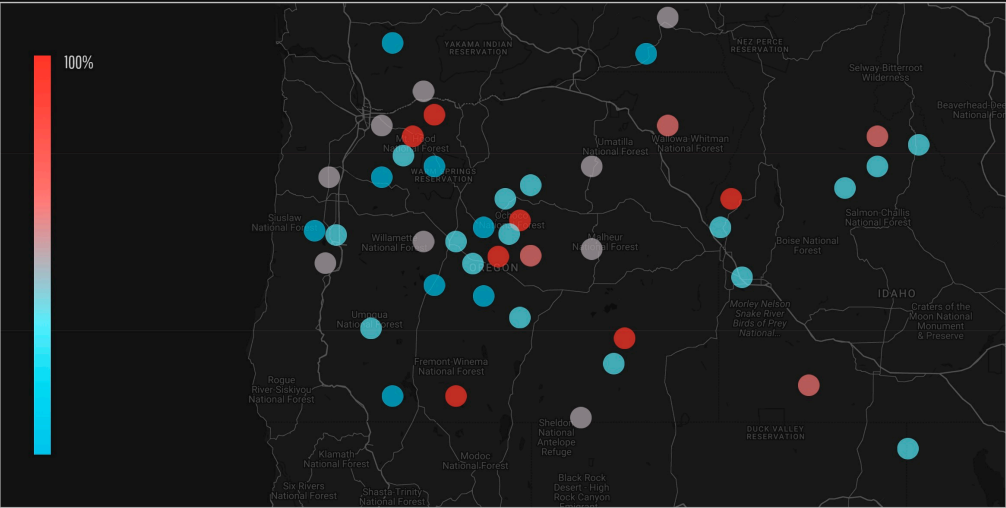
Project type:  
Complete

Design type:  
Building

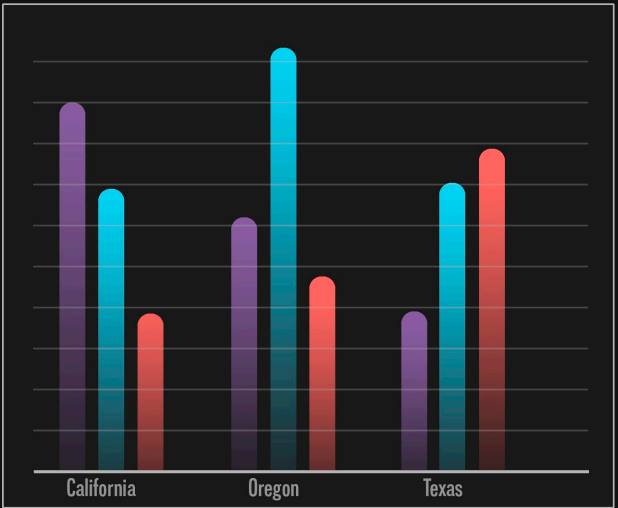
Construction type:  
New Construction



Model vs AIA Energy Reduction



Compared US states chart



Filter Panel

Select a location

Select a design type

Select a project phase

Completed year

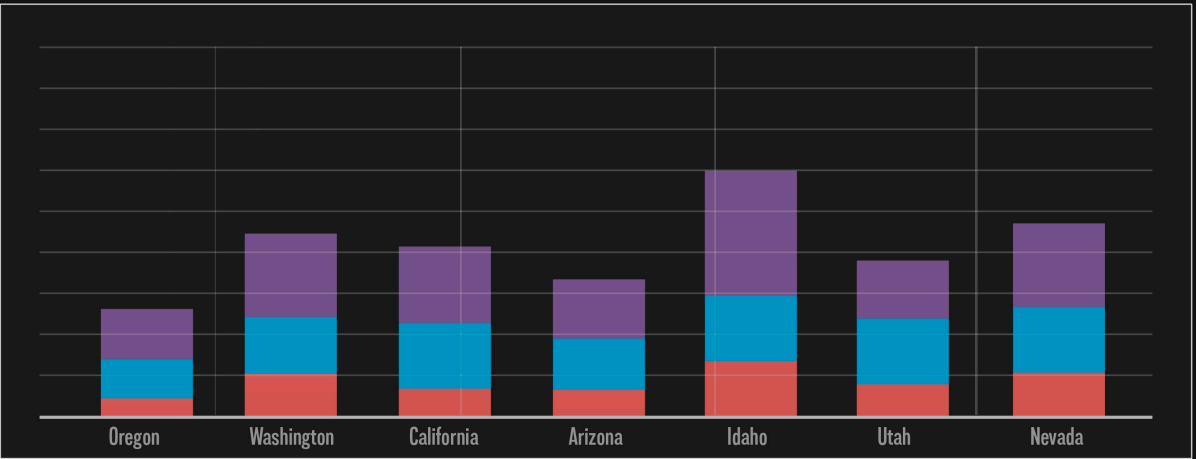
2018 2020

Submit and Update

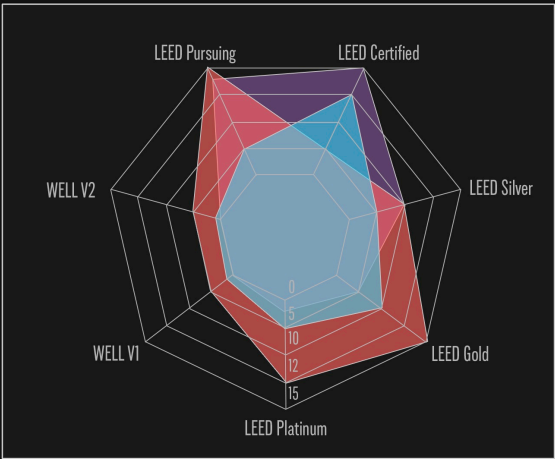
Compared chart



Compared chart



Compared certification chart

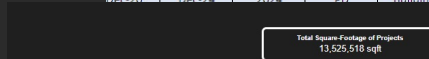


# THE PIECES

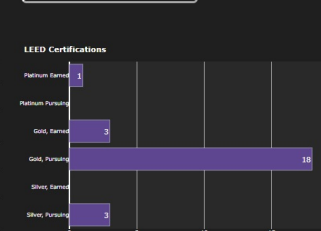
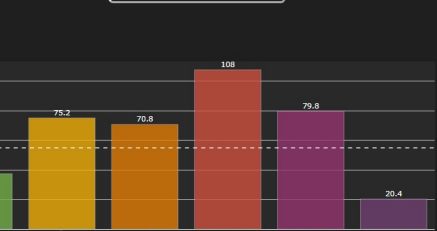
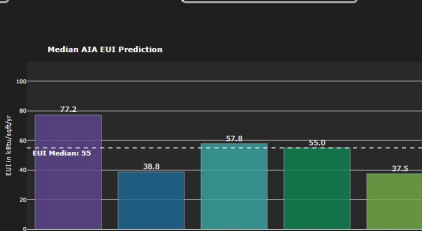
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	0_Interr Assignments	00_PM Contacted	00_Comm LV	1_Project Name	2_Project Number	3_Contact	4_Start Date	5_End Date	6_Project Year	7_Proj Phase	8_Design Type	9_Construction Type	10_Project Type	11_City	12_State Code	13_Climate Zone	14_Certifi- cation	15_Cert Level	16_Certifi- cation Status	17_Project Energy Modeled	18_Model- ing Firm	19_Model- ing Software	20_Energy Report Available	21_Proj- Area	22_Energy
2	Amber Z	Y			20196270	Richard Dobrot	Apr-22	Dec-22	2022	CD	Building	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Scheduled	Glumac	eQuest		76719	Oregon Energy C
3	Amber Z	Y			20216060	Matt Bray	Feb-21	Dec-24	2024	SD	Building	New Construction	Mixed Use	Murray	UT	5B	LEED	Gold	Pursuing	Scheduled	Glumac	eQuest		413948	2018 IEC
4	Lucy S		recontact 03/		20216070	Taylor Pasic	Aug-21	Jan-30	2030	CA	Interiors	Renovation	Office	Portland	OR	4C			No					11000	N/A
5	Amber Z	Y	X		20150100	Keith Skille	Feb-15	May-21	2021	Complete	Building	New Construction	Mixed Use	Los Angeles	CA	3B	WELL	V2	Pursuing	Yes	Glumac	eQuest	Consultants	498599	Title 24 - 2
6	Lucy S				20206470	Katherine Schultz	Dec-20	Jan-30	2030	PD	Building	New Construction	Multi-Family	Portland	OR	4C			No				N/A		N/A
7	Lucy S		recontact 03/		20170131	Taylor Pasic	Apr-22	Aug-22	2022	BP	Interiors	Renovation	Office	Portland	OR	4C			No					8900	N/A
8	Amber Z	Y			20211000	Kyle Andersen		Jan-30	2030										No						
9					2017100	Phil Beyl			2021	Complete	Building	New Construction	Hotel	Anaheim	CA	3B	LEED	Silver	Pursuing	Yes		Energy Plus			Title 24 - 2
10	Lucy S	C+			20196040	Steve Rupert	Feb-19	Sep-21	2021	CA	Building	New Construction	Office	Hillsboro	OR	4C			Yes		WSP	IES-VE		35000	ASHRAE 90.1
11	Lucy S	C	recontact 03/		20206330	Kyle Andersen	Jan-21	Sep-22	2022	SD	Interiors	Renovation	Multi-Family	Bellevue	WA	4C	LEED	Gold	Earned					175000	ASHRAE 90.1
12	Amber Z	Y			20206331	Kyle Andersen		Jan-30	2030										No						
13	Amber Z	Y			20171500	Matt Lamb	May-17	Mar-23	2023	CA	Building	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Yes	Glumac	eQuest	-06-10	844117	ASHRAE 90.1
14					20149000	Michelle Schulz		Jan-30	2030	Complete	Building	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Earned	Yes	Glumac	eQuest		450350	ASHRAE 90.1
15					20149000	Nathan Orrison		Jan-30	2030	Complete	Building	New Construction	Mixed Use	Portland	OR	4C	LEED	Platinum	Earned	Yes	Glumac	eQuest		144125	ASHRAE 90.1
16					20157102	Phillip Beyl		Jan-30	2030	Complete	Building	New Construction	Multi-Family	Portland	OR	4C	LEED	Gold	Earned	Yes				51836	Oregon Energy C
17	Lucy S				20206320	Katherine Schultz	Oct-20	Jan-30	2030	PD	Building	New Construction	Multi-Family	Clackamas	OR	4C			No				N/A		
18							Aug-19	Jun-21	2021	Complete	Building	New Construction	Student Housing	Cloverdale	OR	4C			No					12536	Oregon Energy C
19							Nov-20	Mar-23	2023	CA	Building	New Construction	Retail	Portland	OR	4C	LEED	Silver	Pursuing	No				12500	Oregon Energy C
20							May-22	Mar-25	2025	PD	Building	New Construction	Mixed Use	Beaverton	OR	4C	LEED	Silver	Pursuing	Scheduled				201000	Oregon Energy C
21							Nov-20	Mar-23	2023	CD	Building	New Construction	Retail	Beaverton	OR	4C	LEED	none	Pursuing	No				16708	ASHRAE 90.1
22							Dec-20	Dec-24	2024	PD	Building	New Construction	Mixed Use	Beaverton	OR	4C	LEED	Silver	Pursuing	Scheduled				148000	ASHRAE 90.1

```
dashboards.py
1 import pandas as pd
2 import numpy as np
3 import plotly.express as px
4 import plotly.graph_objects as go
5
6 from dash import Dash
7 from dash import dash_table
8 from dash import html
9 from dash import dcc
10 from dash.dependencies import Input, Output
11
12 app = Dash(__name__)
13
14 colors = {'background': '#F1F1F1', 'plot background': '#F1F1F1',
15          'text': '#FFFFFF00'}
16 color_LEED = ["rgb(50, 100, 100)"]
17 custom_color = [[0, "rgb(50, 100, 100)"], [0.5, "rgb(29, 105, 150)"], [1.0, "rgb(95, 70, 144)"]]
18
19 df = pd.read_csv(
20     # r"C:\Users\amberz\GBD Architects Incorporated\2022 ETO NZEL Internship - "
21     # r"C:\Users\ericl\GBD Architects Incorporated\2022 ETO NZEL Internship - "
22     # r"General\Python & csv Files\00X_Dataframe_Apr_4_22.csv")
23
24 # Data frame limited
25 ddf = df.loc[:, ["1_Project Name", "2_Project Number", "5_End Date", "6_Project Year", "7_Project Phase",
26                "8_Design Type", "9_Construction Type", "10_Project Type", "11_City", "12_State Code",
27                "13_Climate Zone", "14_Certification", "15_Cert Level", "16_Certification Status",
28                "17_Project Energy Modeled", "21_Project Area", "23_AIA EUI", "23b_Total Energy Use",
29                "24_Code EUI (kBtu/sf/yr)", "26_Modelled EUI", "29_PV"]]
30 ddf = ddf.dropna(subset=["23_AIA EUI"]).reset_index()
31 df_Usage = ddf.dropna(subset=["23b_Total Energy Use"]).reset_index()
32 df_model = ddf.dropna(subset=["26_Modelled EUI"]).reset_index()
33
34 # Cards
35 # Dataframe with all projects lacking a project area removed + total sq footage
36 total_sqft = "(1,).format(int(ddf['21_Project Area'].agg(sum)))
37 # print("Total sq footage of all GBD projects:", total_sqft, "sqft")
38
39 # Number of projects
40 count = ddf["2_Project Number"].value_counts(dropna=False).sum()
41 # print("Total # of GBD projects:", count)
42
43 # Average EUI
44 average_EUI = ddf["23_AIA EUI"].mean()
45 median_EUI = ddf["23_AIA EUI"].median()
46 # print("Total median EUI for GBD projects:", median_EUI, "Btu/sqft/yr")
47
48 # Average energy reduction based on modeled EUI
49 pos_values = ddf[ddf["26_Modelled EUI"] < ddf["23_AIA EUI"]]
50 reduction = (((pos_values["23_AIA EUI"] - pos_values["26_Modelled EUI"]) / pos_values["23_AIA EUI"]) * 1
51 # print("Average Energy Reduction Percentage:", round(reduction), "%")
52
53 # Tables of LEED and General Data
54 # LEED Table
55 # Concatinated Dataframe
56 LEED = ["LEED"]
57 df_leed = ddf[ddf["14_Certification"].isin(LEED)]
```

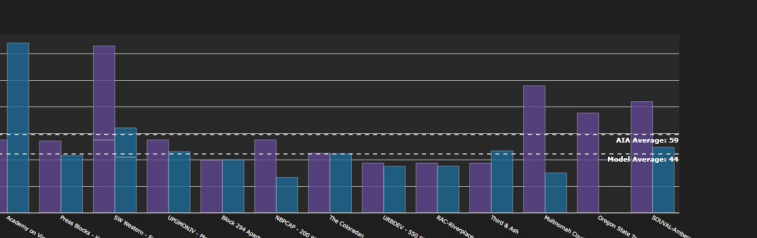
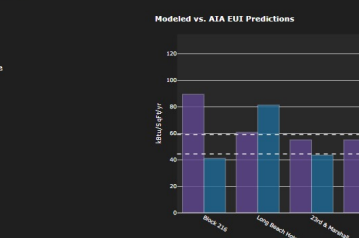
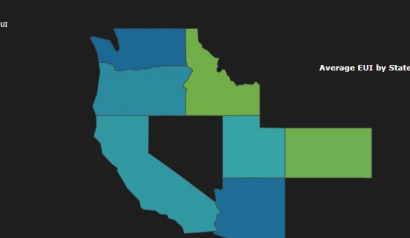
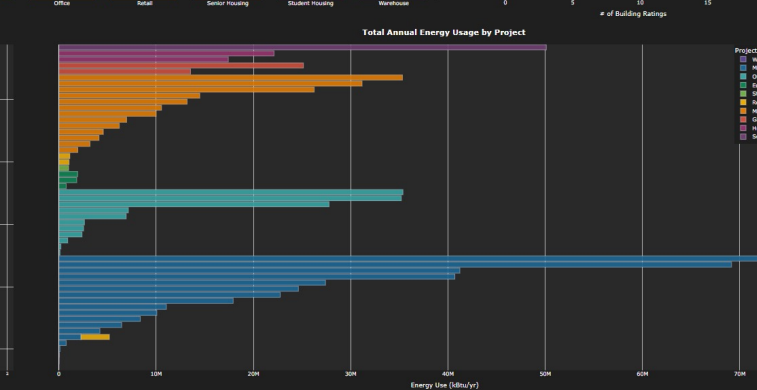
2



GBD Dashboard



3





# GENERALLY INFORMATIONAL

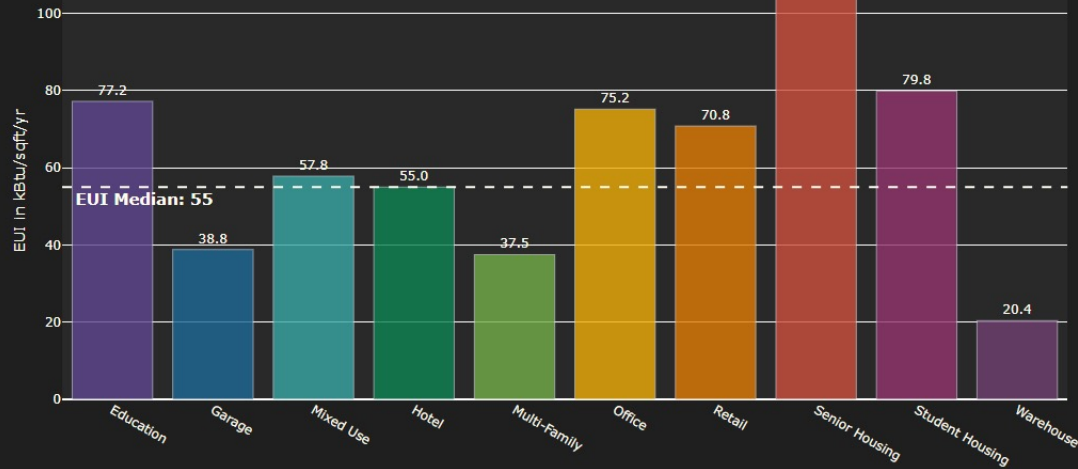
GBD

Total # of Projects  
55

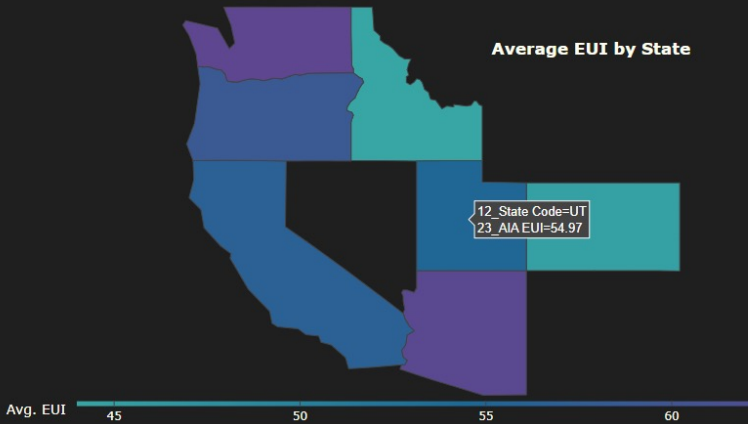
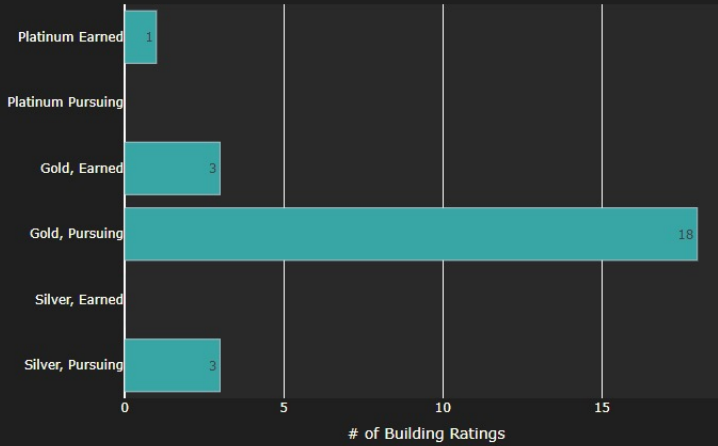
Median EUI Across Projects  
54.97 Btu/sqft/yr

Average Energy Reduction  
37%

Median AIA EUI Prediction



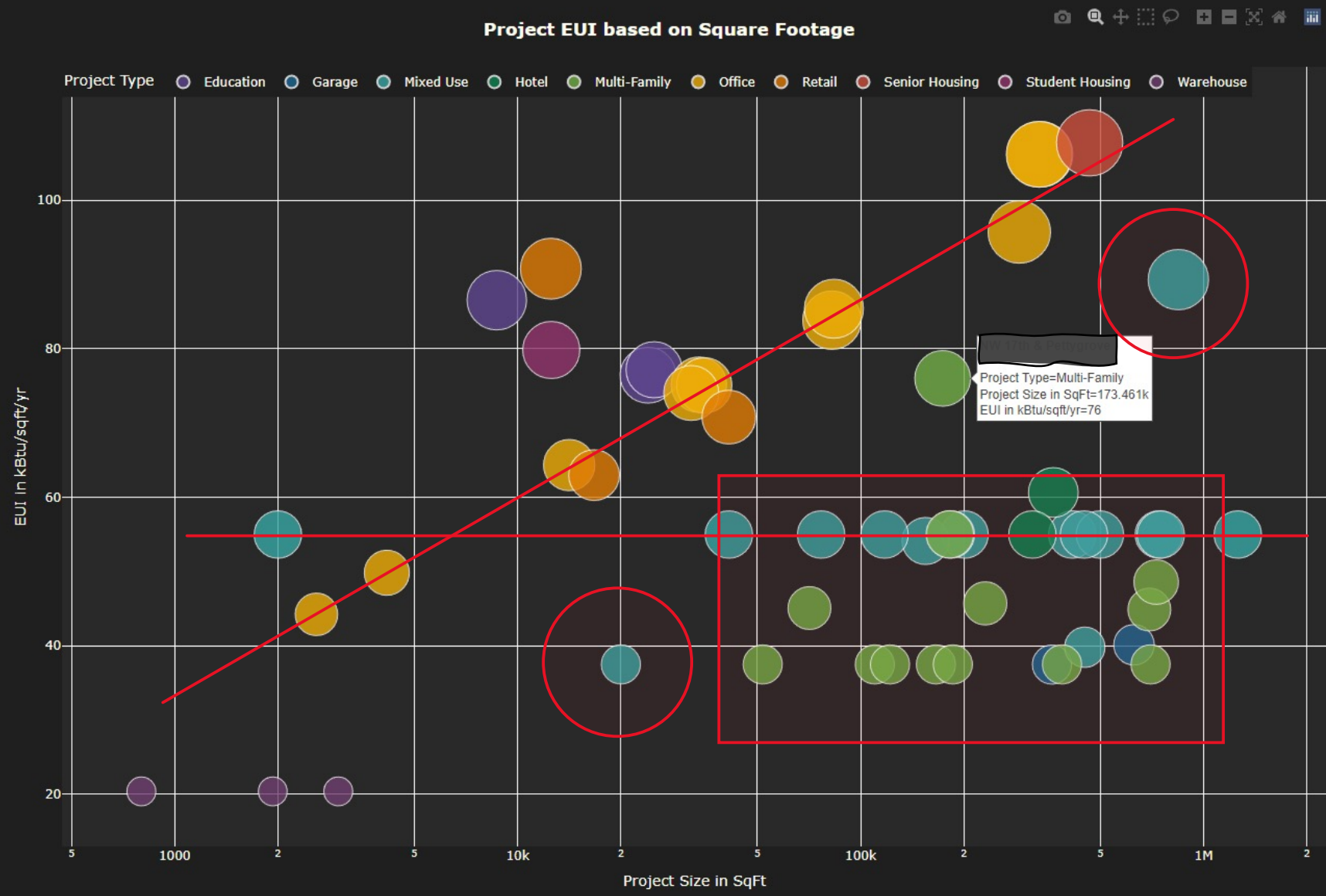
LEED Certifications



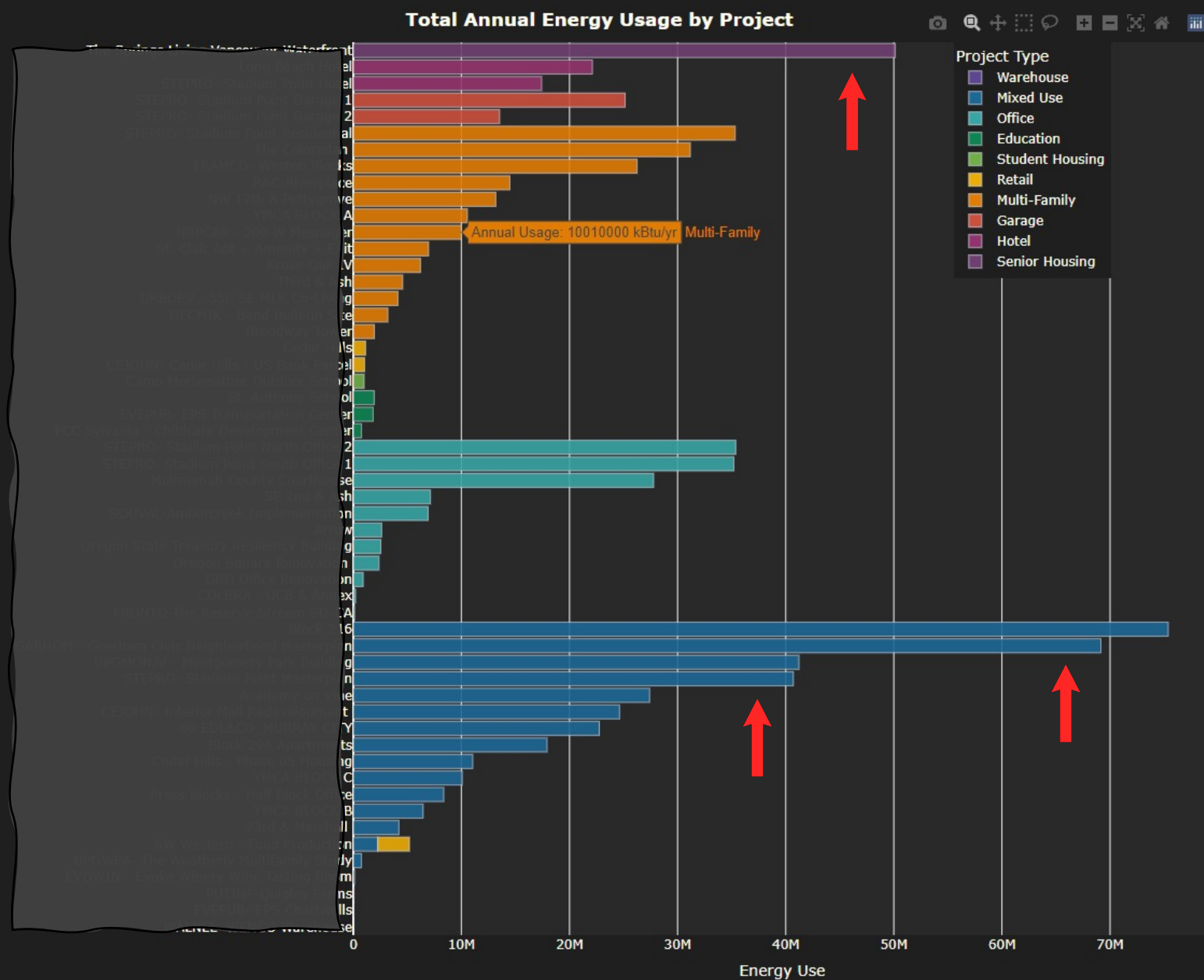
1_Project Number	6_Project Year	7_Project Phase	9_Construction Type	10_Project Type	11_City	12_State Code	13_Climate Zone	14_Certification	15_Cert Level	16_Certification Status	17_Project Energy Modeled	21_Project Area	23_AIA EUI	26_Modelled EUI
20186262	2024	DD	New Construction	Education	Vancouver	WA	4C				Scheduled	24000	76.43	
20097080	2019	Complete	New Construction	Education	Portland	OR	4C	WELL	V1	Earned	Yes	8697	86.53	
20176400	2025	DD	Renovation	Education	Portland	OR	4C				No	25000	77.16	
20210031	2030	SD	New Construction	Garage	Peoria	AZ	2B				No	626642	40.12	
20210041	2030	SD	New Construction	Garage	Peoria	AZ	2B				No	361292	37.46	
20171500	2023	CA	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Yes	844117	89.3	41.06
20156351	2030	On Hold	New Construction	Hotel	Long Beach	CA	3B	LEED	Gold	Pursuing	Yes	364757	60.63	81.2
20210070	2030	SD	New Construction	Hotel	Peoria	AZ	2B				No	316861	54.97	
20196270	2022	CD	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Scheduled	76719	54.97	43.5
20216060	2024	SD	New Construction	Mixed Use	Murray	UT	5B	LEED	Gold	Pursuing	Scheduled	413948	54.97	
20150100	2021	Complete	New Construction	Mixed Use	Los Angeles	CA	3B	WELL	V2	Pursuing	Yes	498599	54.97	127.9
20147514	2025	PD	New Construction	Mixed Use	Beaverton	OR	4C	LEED	Silver	Pursuing	Scheduled	201000	54.97	
20196301	2022	CA	Renovation	Mixed Use	Vancouver	WA	4C				No	2000	54.97	
20206140	2026	MP	New Construction	Mixed Use	Gresham	OR	4C				Scheduled	1250000	54.97	
20166040	2020	Complete	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Yes	154651	54.1	43.19
3021001	2026	PD	New Construction	Mixed Use	Boise	ID	5B	LEED	Gold	Pursuing	Scheduled	117427	54.97	
3021001	2026	PD	New Construction	Mixed Use	Boise	ID	5B	LEED	Gold	Pursuing	Scheduled	183226	54.97	
20147512	2024	PD	New Construction	Mixed Use	Beaverton	OR	4C	LEED	Silver	Pursuing	Scheduled	448000	54.97	
20210000	2021	SD	New Construction	Mixed Use	Peoria	AZ	2B				No	740520	54.97	
20186160	2030	CD	New Construction	Mixed Use	Beaverton	OR	4C	LEED	Gold	Pursuing	Yes	41296	54.97	42
20191005	2023	CD	New Construction	Mixed Use	Portland	OR	4C				20000	37.48		
20186596	2024	CD	Renovation	Mixed Use	Portland	OR	4C	LEED	Gold	Pursuing	Yes	750000	54.97	46
20149000	2030	Complete	New Construction	Mixed Use	Portland	OR	4C	LEED	Gold	Earned	Yes	450350	39.79	40
20216030	2023	CD	New Construction	Multi-Family	Bend	OR	5B				Yes	70936	45.07	
20186181	2024	CA	New Construction	Multi-Family	Lake Oswego	OR	4C				165796	37.48		
20186000	2024	CA	New Construction	Multi-Family	Los Angeles	CA	3C				Yes	182000	55	26.6
20166220	2020	Complete	Renovation	Multi-Family	Portland	OR	4C				Yes	173461	76	
20144000	2020	Complete	New Construction	Multi-Family	Denver	CO	5B	LEED	Gold	Earned	Yes	604755	44.87	44.6



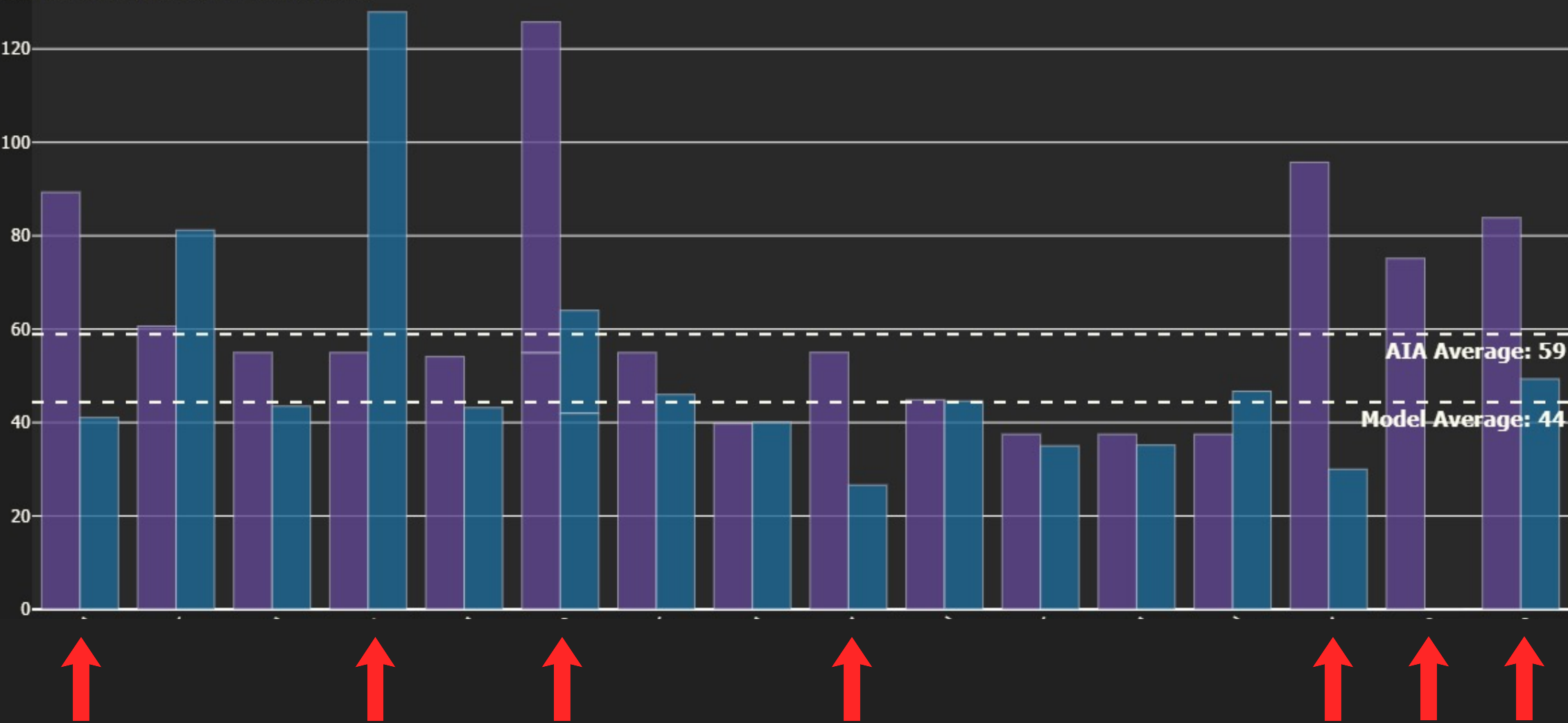
# HOW WE CAN USE THIS INFORMATION (1/3)



## GBD



Modeled vs. AIA EUI Predictions







THANK YOU