GREEN+ 2026
Session 9 - Net Zero Energy

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tacdc
Texas Association of Community Development Corporations

LAKE FLATO

GREEN+ 2026

SUSTAINABLE DEVELOPMENT
10 TRAINING SESSIONS

hosted and supported by

TEXAS ASSOCIATION OF COMMUNITY DEVELOPMENT CORPORATIONS

Why Do We Need a Green CDC Training in Texas?

- Nearly one-third of Texans face high energy burdens, with low-income, minority, and rural communities disproportionately affected due to aging homes and inefficient infrastructure.
- Rising utility costs, grid upgrades, and new industrial demands like data centers threaten to worsen affordability and reliability across the state.
- While conservation and clean energy is a potential solution, public understanding is low and opinions are deeply divided along partisan lines, highlighting a need for broader education and policy focus on both supply and demand.
- Nearly 45% of households pay over $200 a month on average for summer electricity. About one-third of Texans spend 7% or more of their income on energy — surpassing the high energy burden threshold of 6%.

Regina Nippert
Masters in HCD, SMU

Co-Founder of
GREEN+

Human Systems & Strategies Design
Sustainable Development Advocate

Karen Brooks Crosby

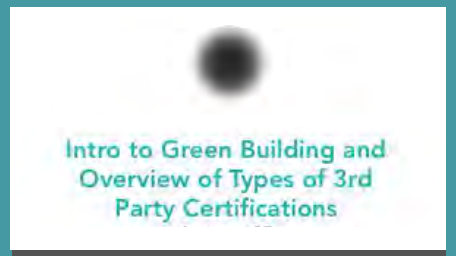
Co-Founder of
GREEN+

MAE B. Real Estate Development
Managing Partner

Beth Brant, AIA, LEED AP BD+C, LFA

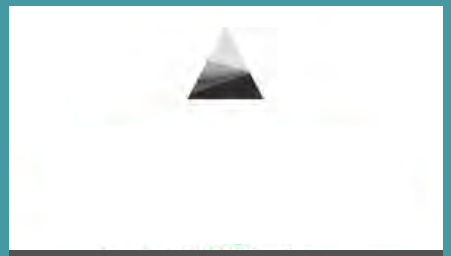
Board Member of
GREEN+

DSGN - Architect / Director of Sustainability/ Principal



Session 1
Today - January 13

Session 2
February 10th

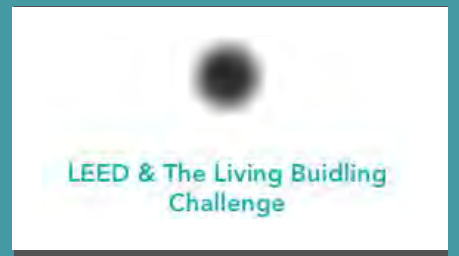


March 29 - 31
TACDC Conference

Session 4
April 14

Session 5
May 12

Session 6
June 9



Session 7
July 14

Session 8
August 11

Session 9
September 8

Session 10
October 13

Net Zero Energy (NZE)

September 8

Net Zero Energy (NZE) buildings produce as much energy as they consume over the course of a year, offering both environmental and financial benefits. This session will introduce the concept of NZE, the strategies used to achieve it—such as high-efficiency envelopes, passive design, and renewable energy systems—and how these approaches can be applied to affordable housing and community development projects.

Participants will gain a practical understanding of what "net zero" means, the design and operational considerations involved, and how even incremental steps toward NZE can reduce energy costs, improve comfort, and support sustainability goals.

Presenters

Beth Brant, AIA,
LEED AP BD+C, LFA

bbrant@dsgn.com

DSGN

Katelynn Essig
Director of Sustainability

FOUNDATION COMMUNITIES

Kate Sector Greg
Assoc. AIA, LFA, WELL AP,
LEED Green Associate

ksector@lakeflato.com

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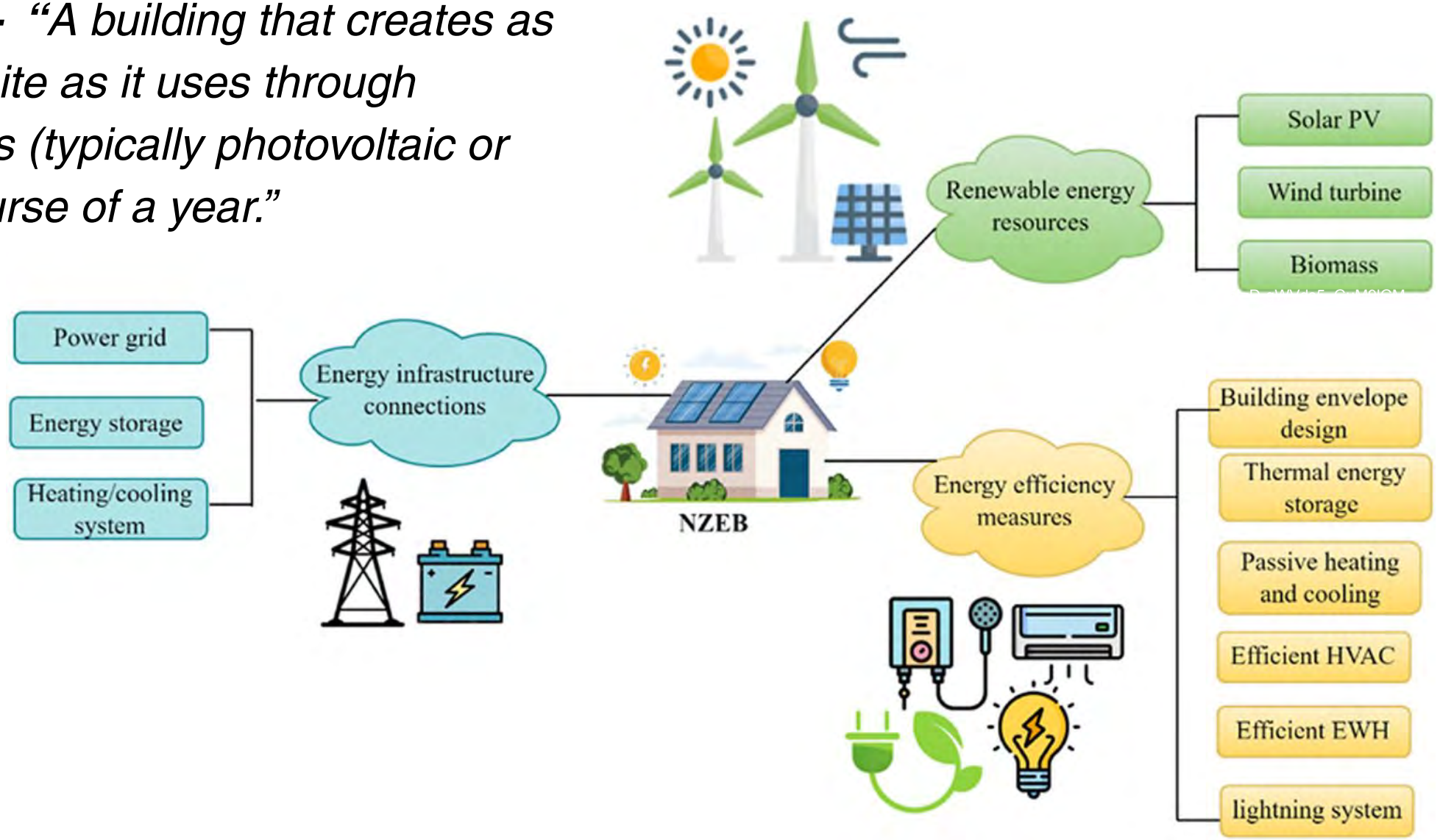
Agenda

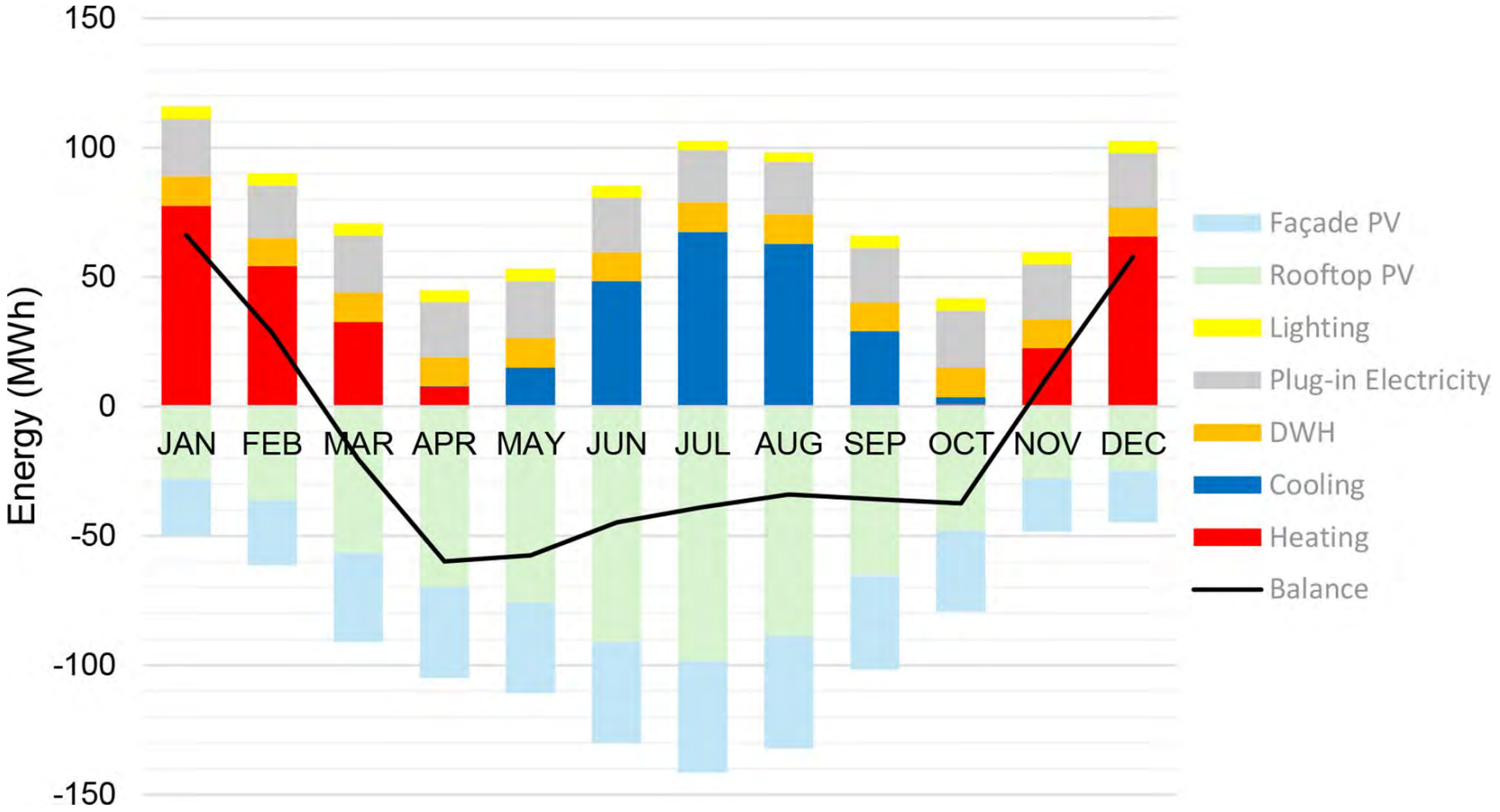
1. What do we mean by Net Zero Energy (NZE)?
2. High Efficiency Envelopes & Passive Design
3. High Efficiency HVAC, Lighting, Plug Loads
4. Designing for Future Climate
5. Renewables in Texas
6. Energy Modeling and Tracking Usage
7. Case Studies

What do we mean by Net Zero Energy (NZE)?

Net zero energy - *"A building that creates as much energy on-site as it uses through renewable sources (typically photovoltaic or wind) over the course of a year."*



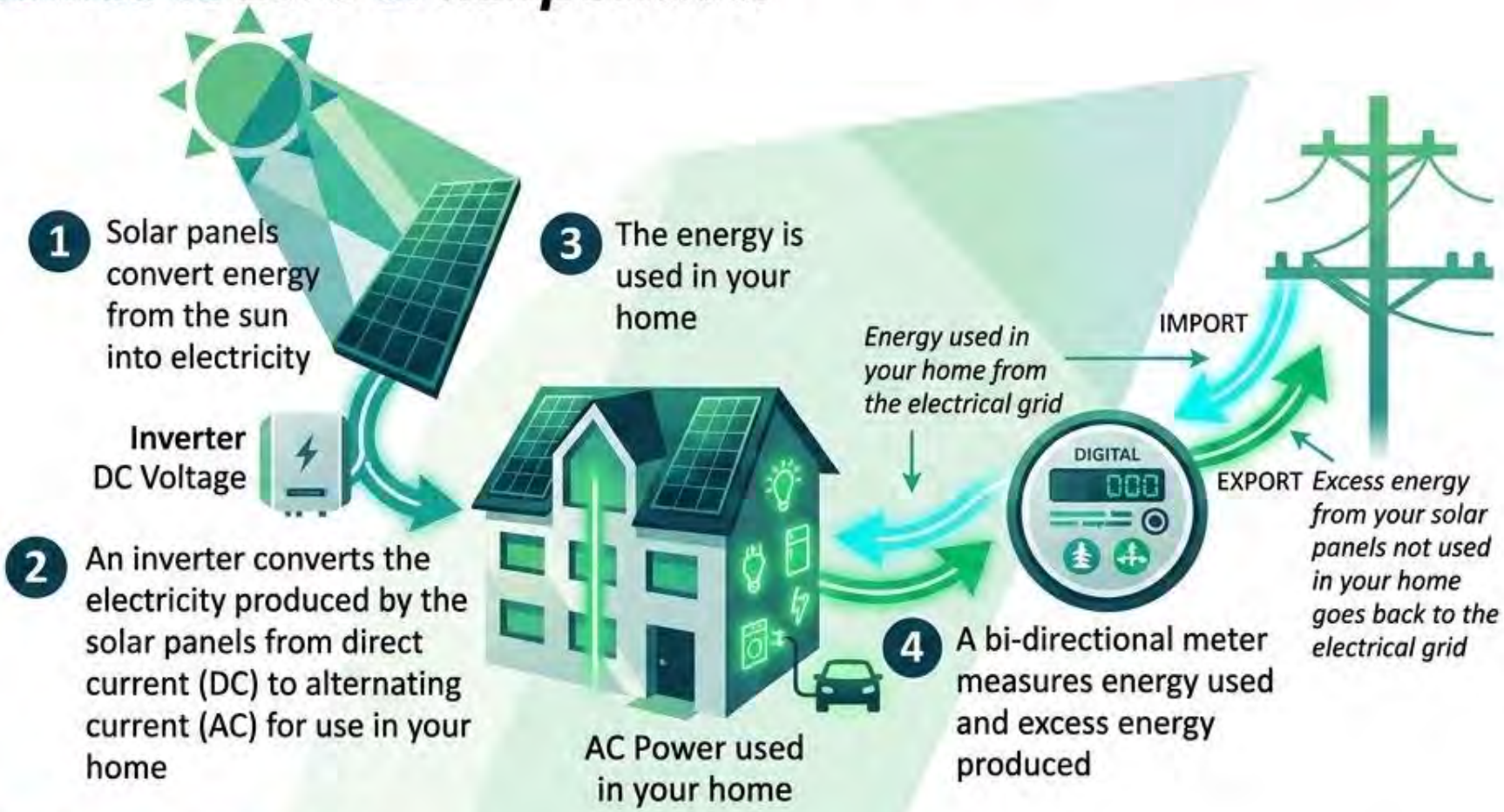
What do we mean by Net Zero Energy (NZE)?



In this example the building is set in a northern part of the US, the building has both facade and roof top PVs that capture energy all year and off set the energy needed to heat and cool the building throughout the seasons.

What do we mean by Net Zero Energy (NZE)?

Over the course of the year total energy consumption comes to *zero* or *net positive*.



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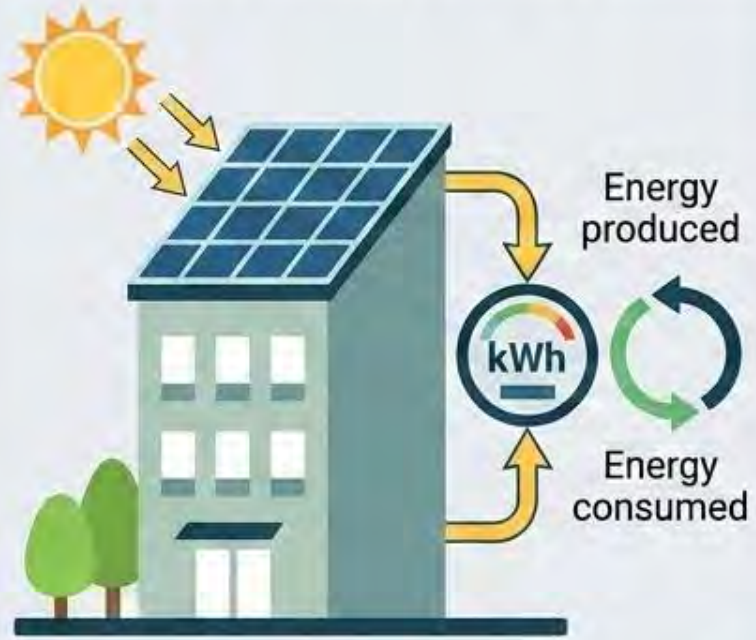
Classic "net metering" is not always available but there are other methods available via your power provider's solar buy back programs.

https://nuwattenergy.com/en/texas/net-metering-texas-2026

https://www.powertochoose.org/en-us/Content/Resource/Selling-Renewable-Power

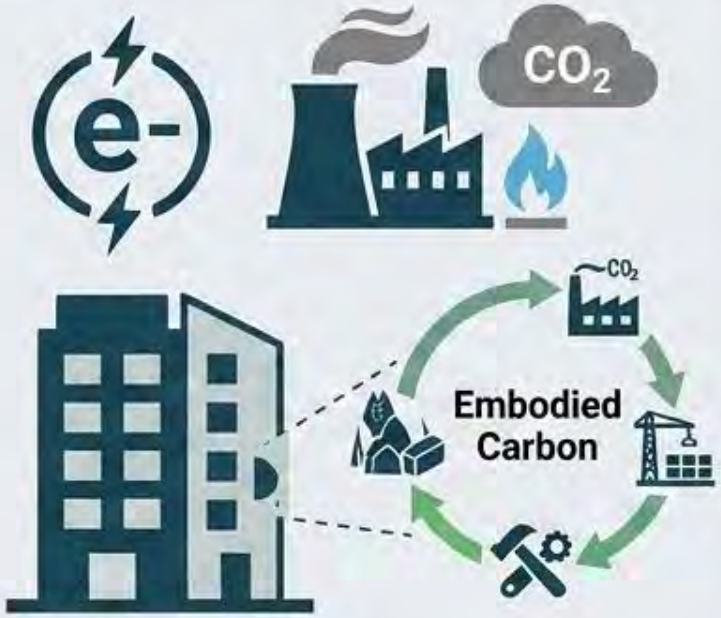
What do we mean by Net Zero Energy (NZE)?

Net Zero Energy



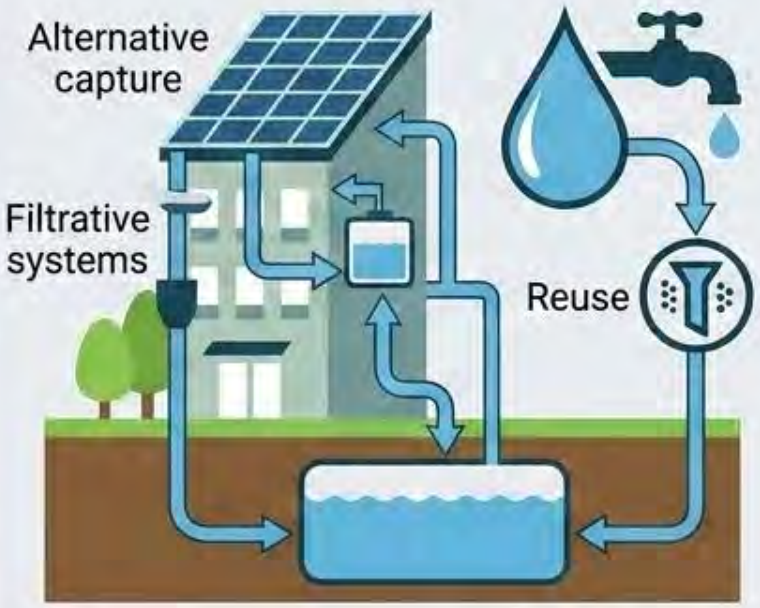
Addresses energy consumption only. Focuses on the yearly balance of energy used versus energy produced on-site through renewables.

Net Zero Carbon



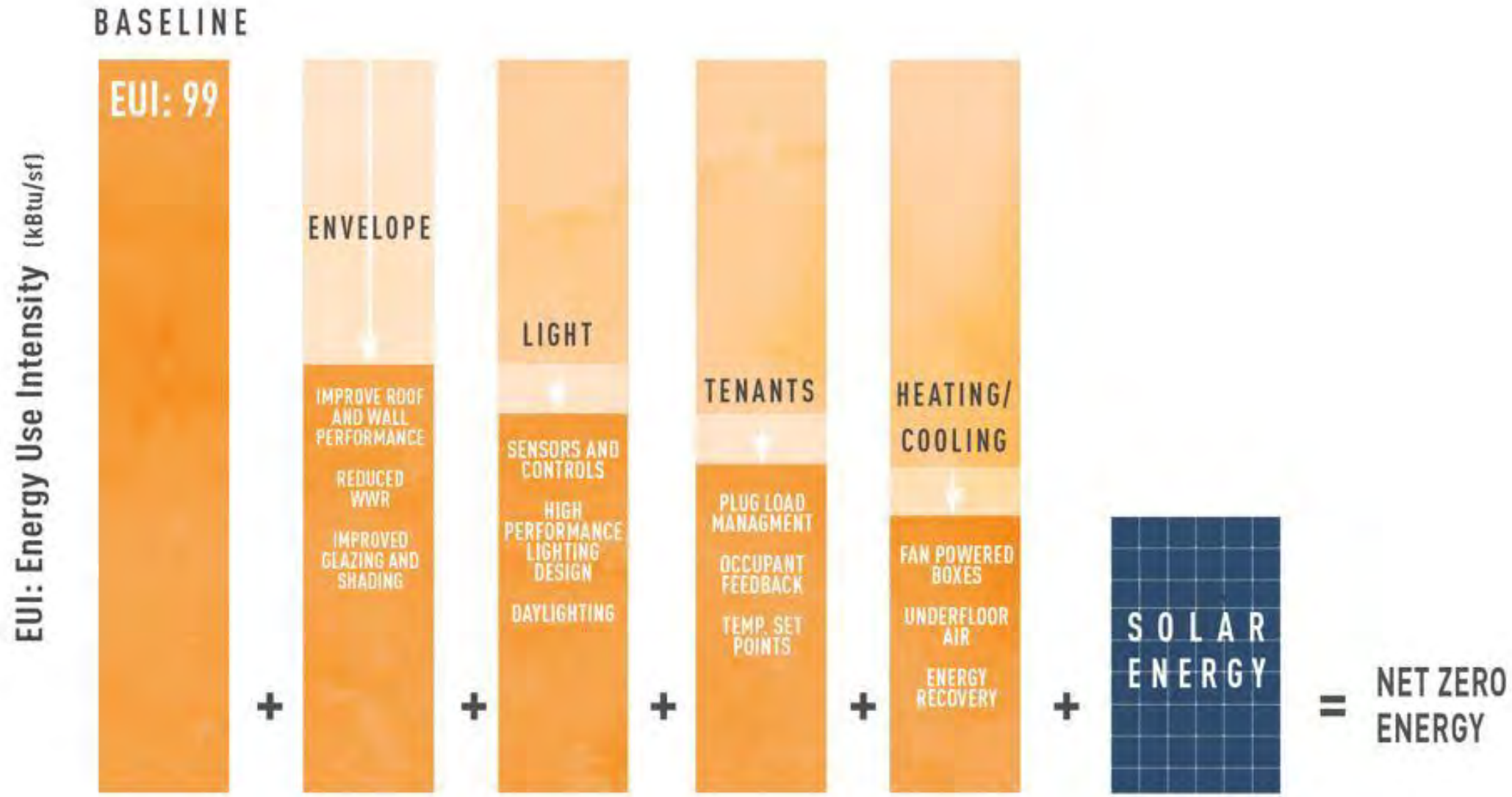
Considers the energy mix from the grid (if carbon-emitting fuel sources like natural gas are used) and the entire lifecycle's embodied carbon.

Net Zero Water



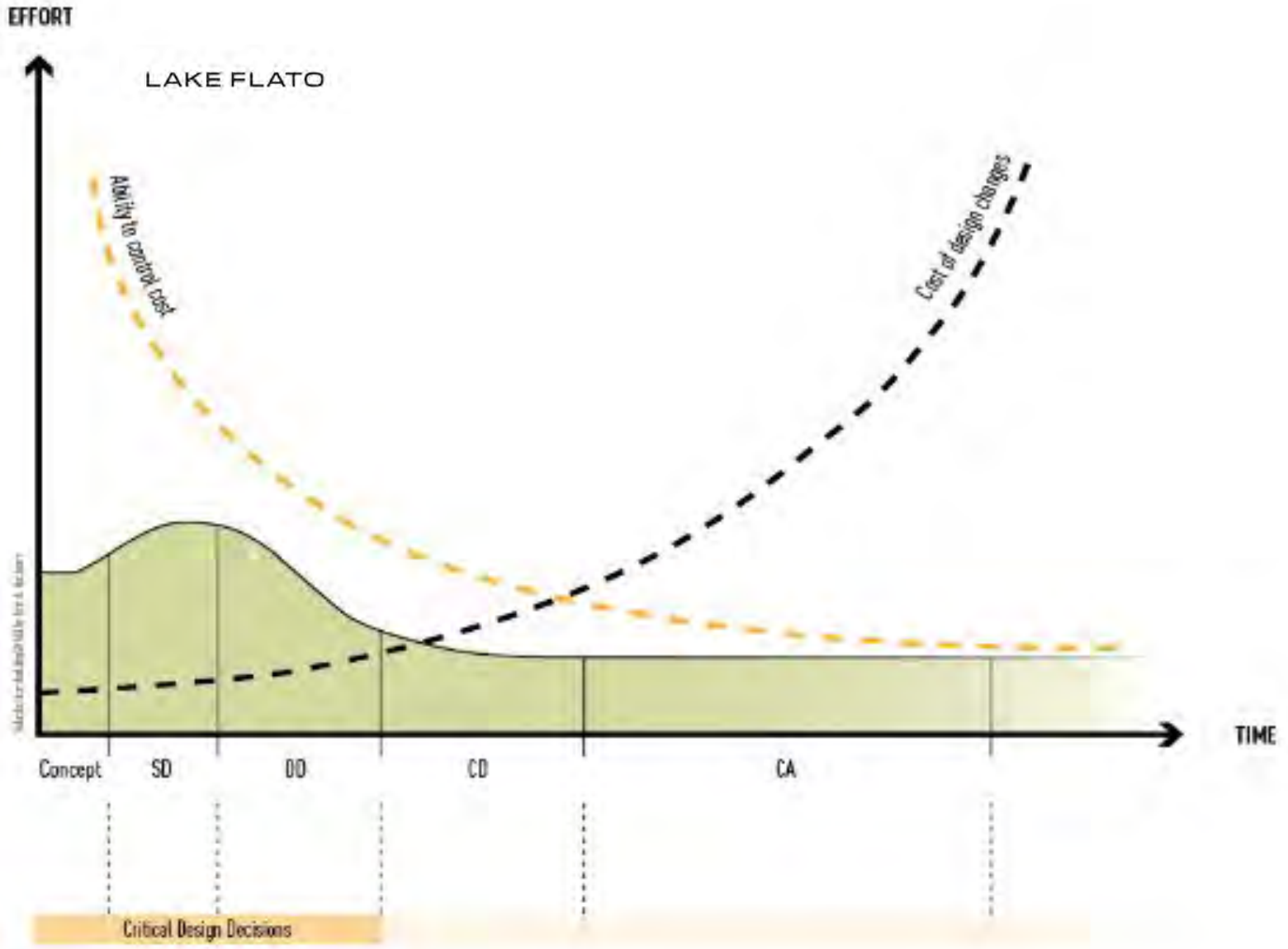
Similar principles to Net Zero Energy, but applied to water. Balance of alternative water used and returned to original sources equals's total water consumption.

Path to Zero: Passive, Active, then Renewables

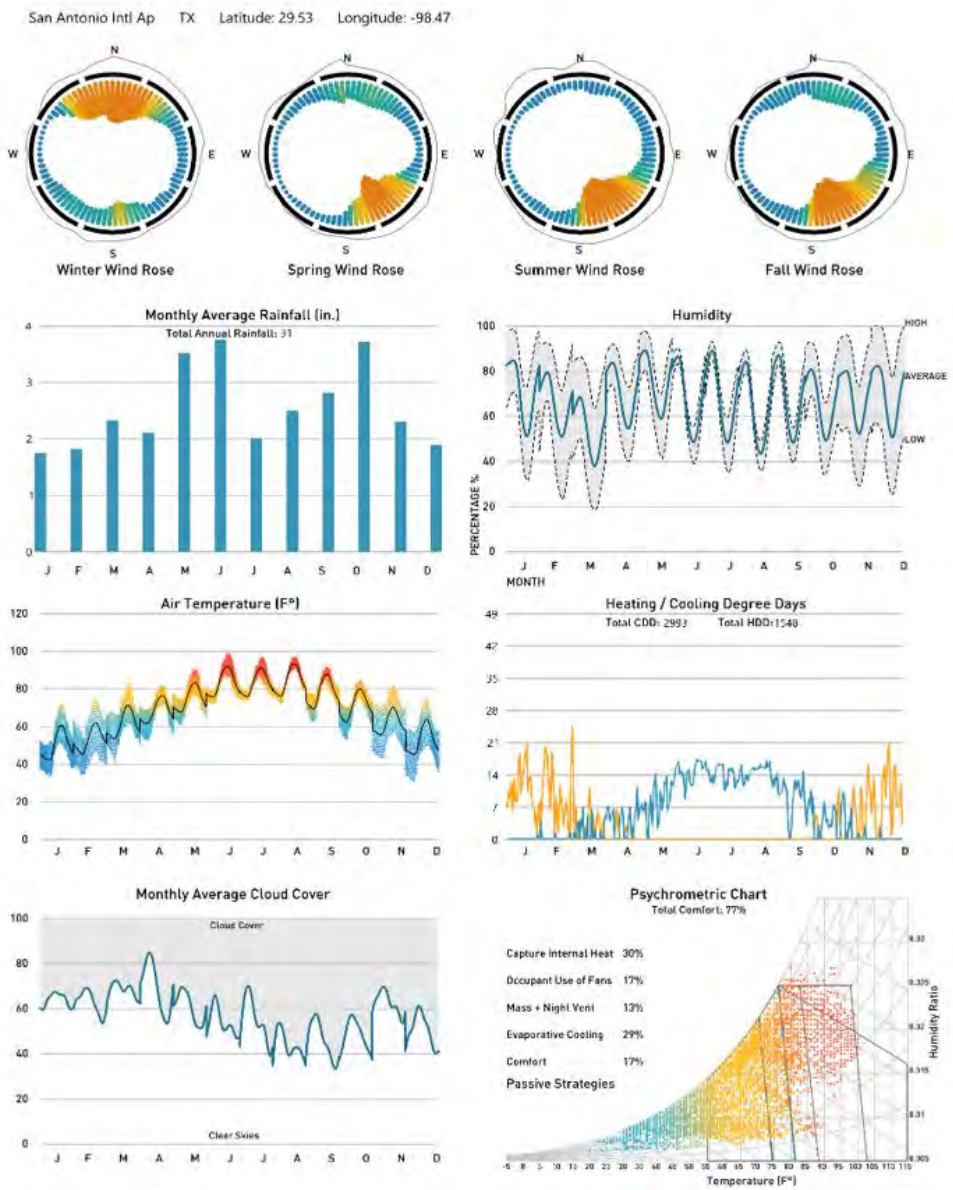


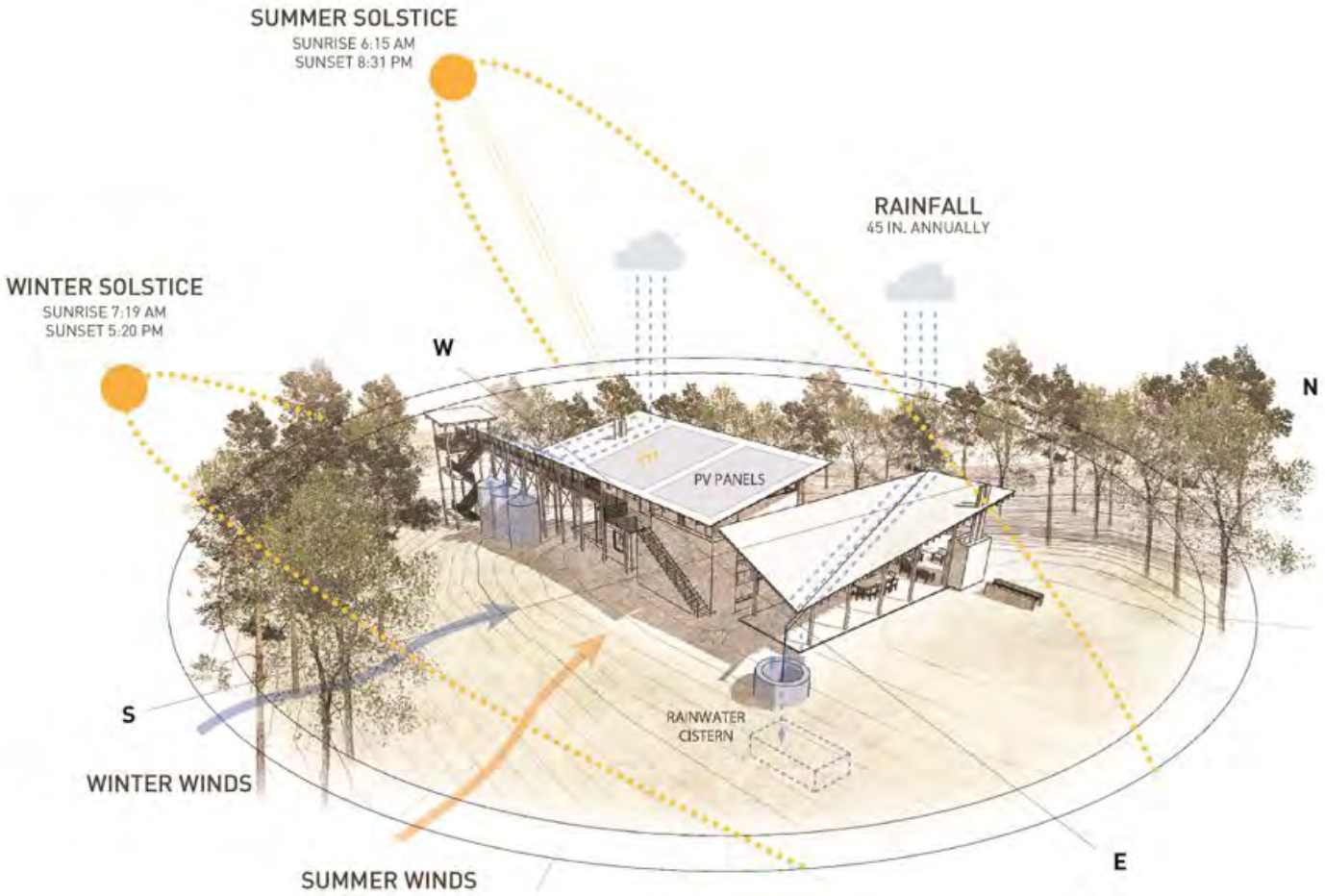
Integrated design and energy-focus from the start

Upfront investing saves time and money



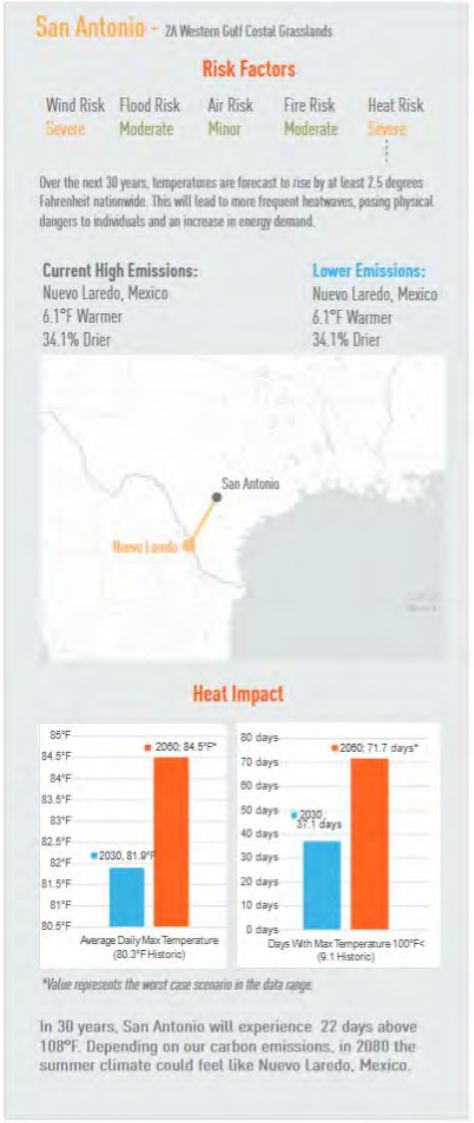
Site and climate analysis to inform passive strategies

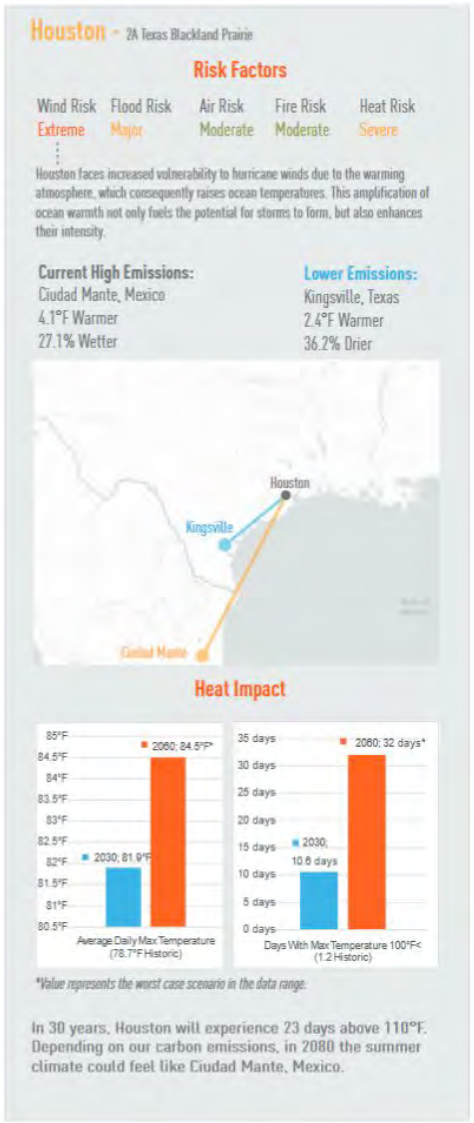


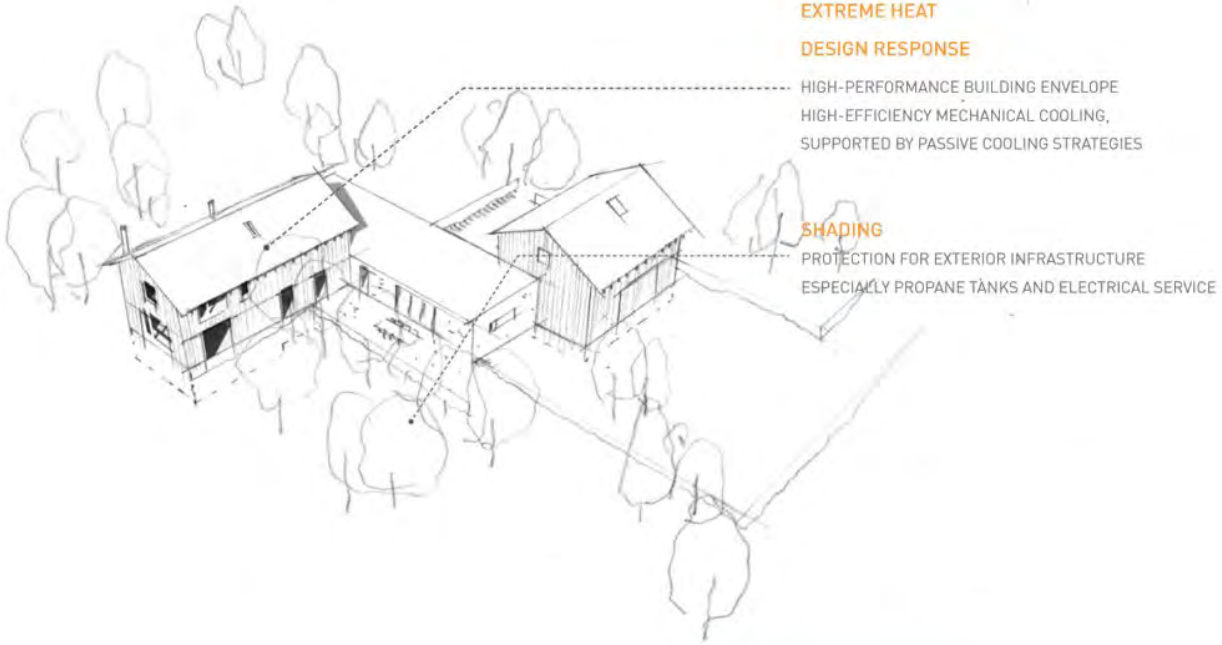


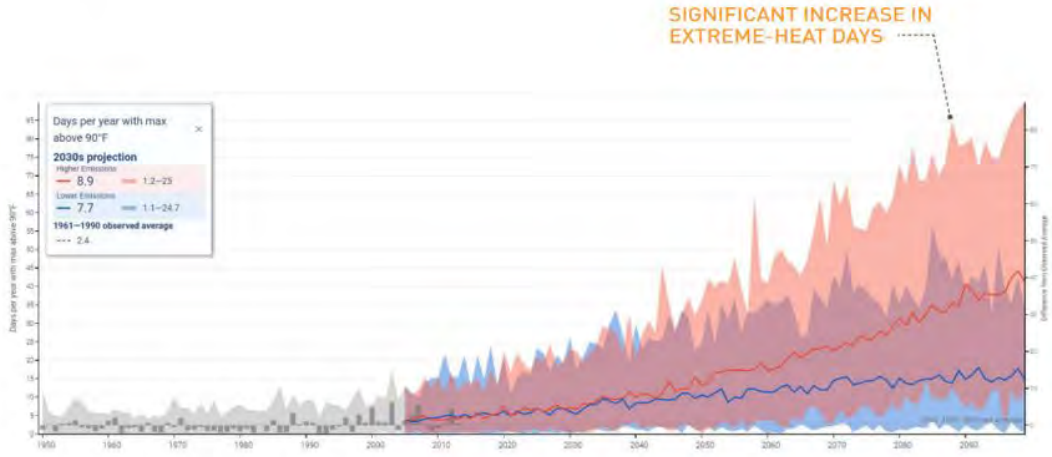
Future climate passive design and resiliency in Texas

Resource: [The Future Ain't What It Used To Be by Lake Flato Architects - Issuu]









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High Efficiency Envelopes & Passive Design

As a reminder from GREEN+ Session 4, we should first always work on creating highly efficient building envelopes and incorporate Passive Design Strategies that work for your climate zone and micro climate before adding renewables or other active systems

Passive Design

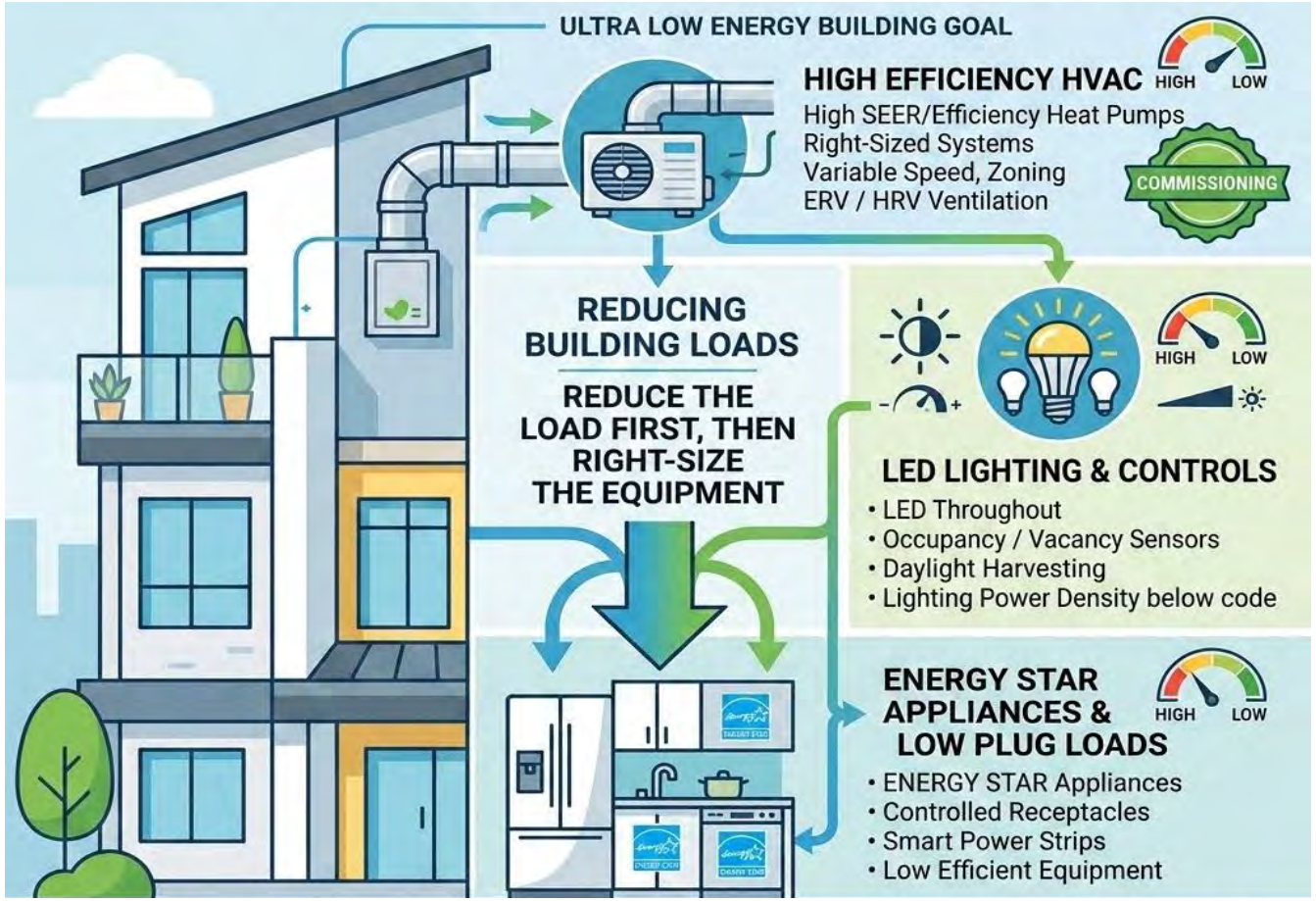
- shape / size
- orientation
- insulation
- windows
- shading
- natural ventilation

Active Systems

- HVAC
- lighting
- electrical power
- renewables

High Efficiency HVAC, Lighting, Plug Loads

Once the envelope is doing all the work it can, we design the systems that meet what's left — as efficiently as possible. Reduce the load first, then right-size the equipment to it.



Plug Loads

- ENERGY STAR appliances and equipment
- controlled receptacles, smart power strips
- peak demand response / load shifting
- high efficient elevators, kitchen, and specialty equipment

HVAC

- high SEER rated or high efficiency heat pumps
- right-sized to the reduced load - not rules of thumb
- variable speed equipment, zoning, good controls
- energy recovery ventilation (ERV / HRV)

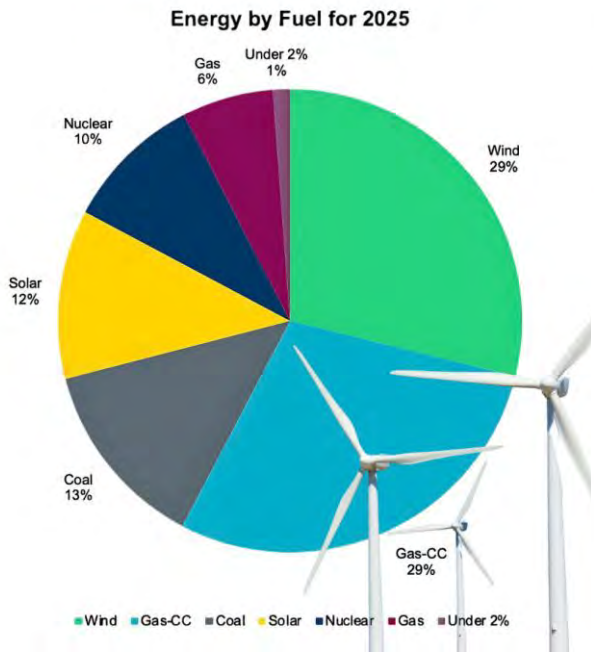
Lighting

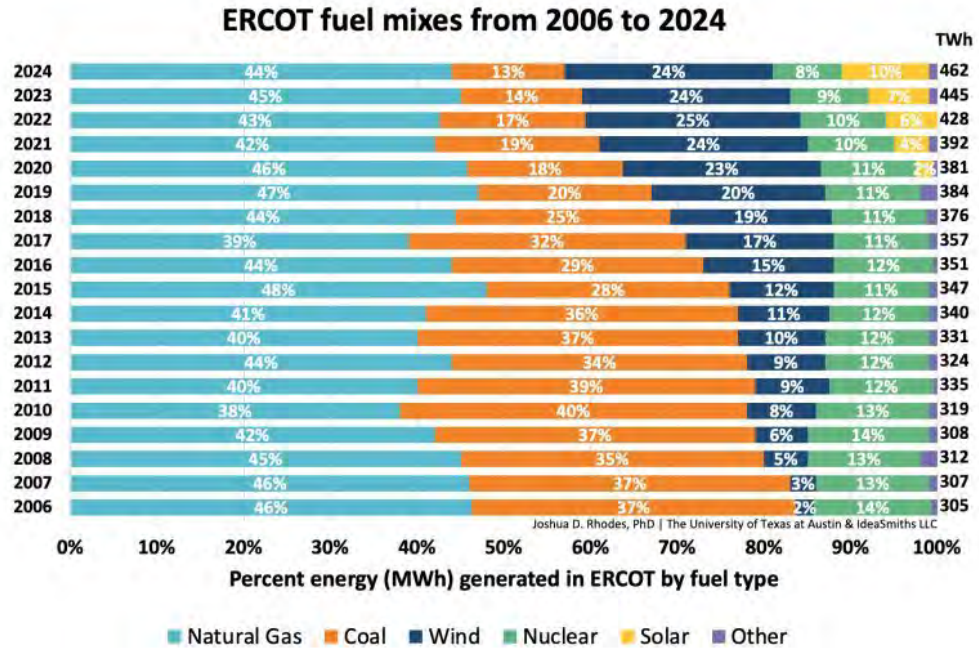
- LED throughout
- lighting power density below code
- occupancy / vacancy sensors
- daylight harvesting and dimming

Renewables in Texas

ERCOT

- ~29% Gas-CC / NG ~29% wind ~12% solar ~13% coal ~10% nuclear
- Wind + solar ≈ a third of annual energy — highest of any US grid
- Solar peaks midday; the dirtiest hours are the 5–9 p.m. gas ramp



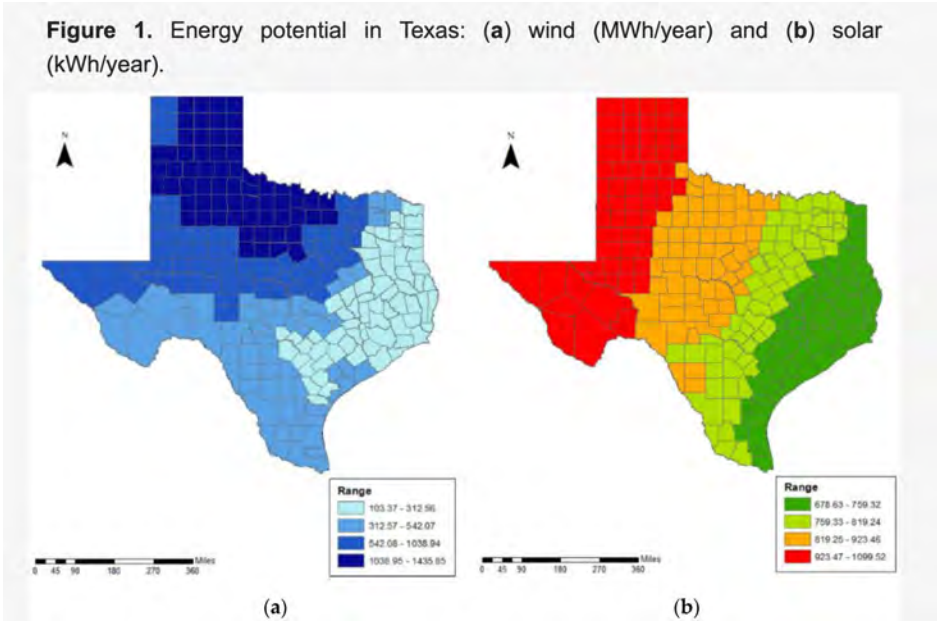


On-site wind — narrow window

- Only pencils in the Panhandle/South Plains, Permian, and the coastal bend (Corpus–Brownsville)
- Needs open fetch, a real tower (80'+), and a site with acreage
- Building-mounted turbines under-perform almost everywhere! Skip them
- *Coastal wind is the outlier: it blows hardest on hot summer afternoons*

On-site solar — works statewide

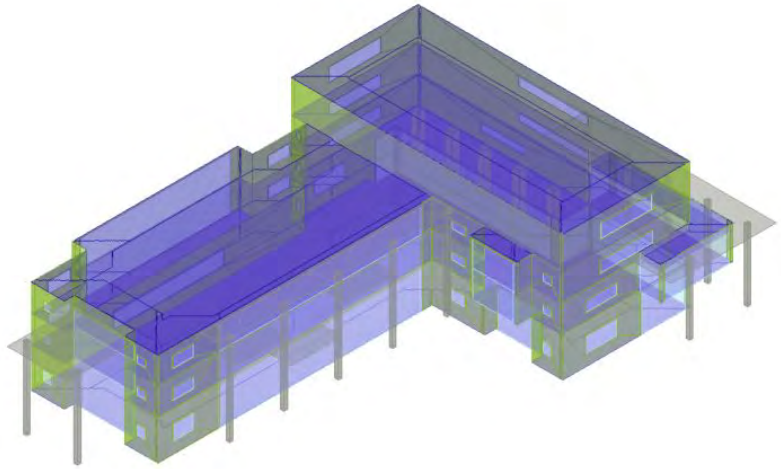
- Yield varies only ~20% across Texas: ~1,650 kWh/kWp El Paso, ~1,400 kWh/kWp Houston
- Economics are set by your retail provider's buyback, not by sun
- Spec hail-rated modules and check ASCE 7 uplift before you commit roof
- *Rule of thumb: ~10 W per sf of usable low-slope roof*



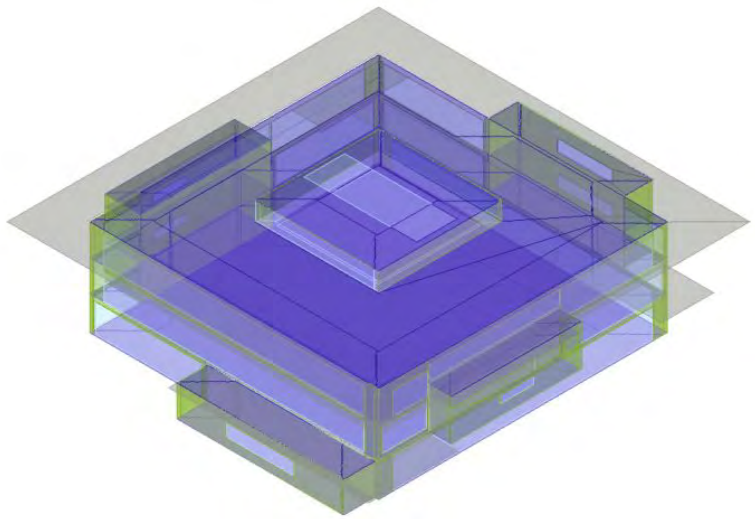
Energy Modeling – Why do we do it?

Early energy modeling helps understand what strategies help reduce energy usage for best ROI
Necessary for achieving net-zero energy and predicting potential PV offset

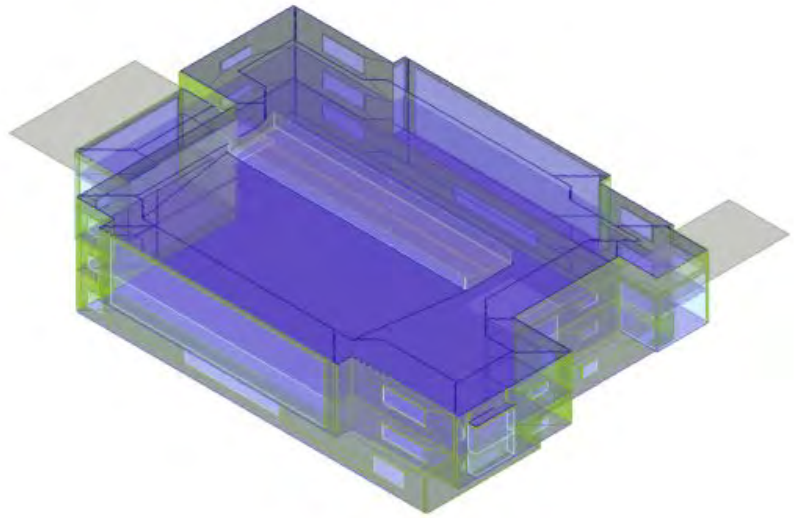
Option 1



Option 2



Option 3

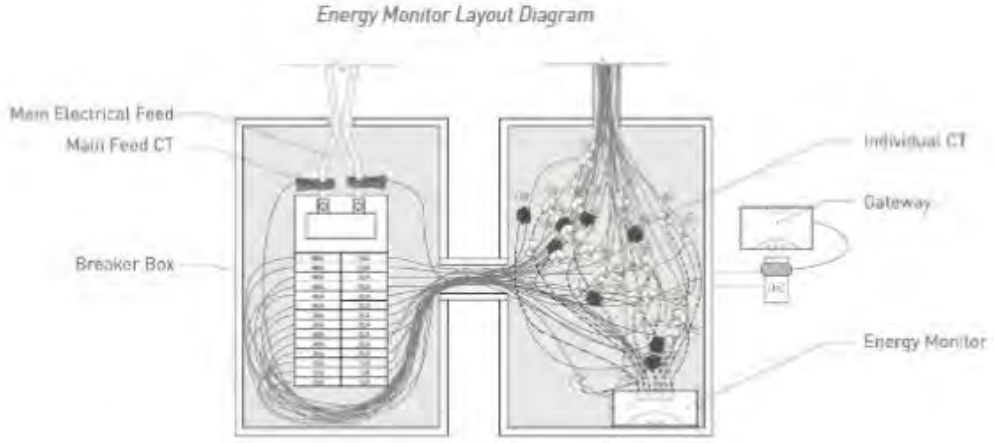


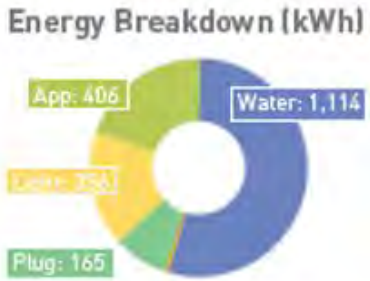
The L-shaped form *allowed for slightly lower energy use through self-shading geometry, narrower floor plates that improve daylighting and reduce lighting loads, increased natural ventilation potential, and orientation-responsive window placement that minimizes excessive heat gain.*

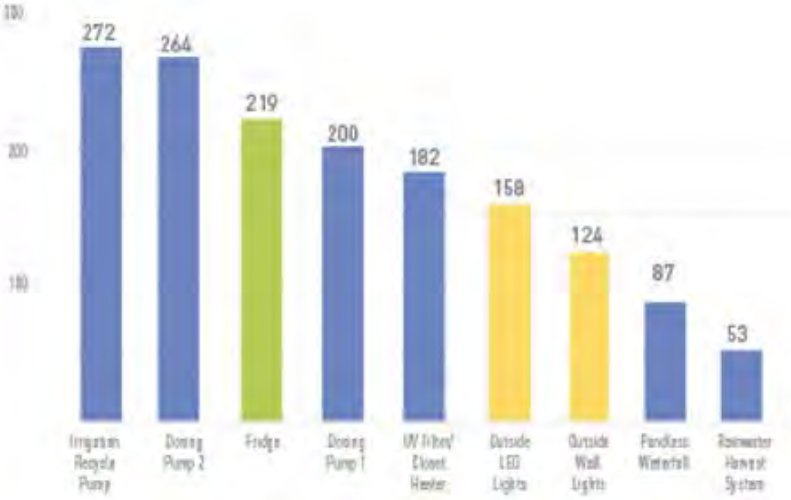
Design Performance and Sustainability with Autodesk Forma Site Design, Revit, and Forma Carbon Insights | Autodesk

Tracking Actual Usage

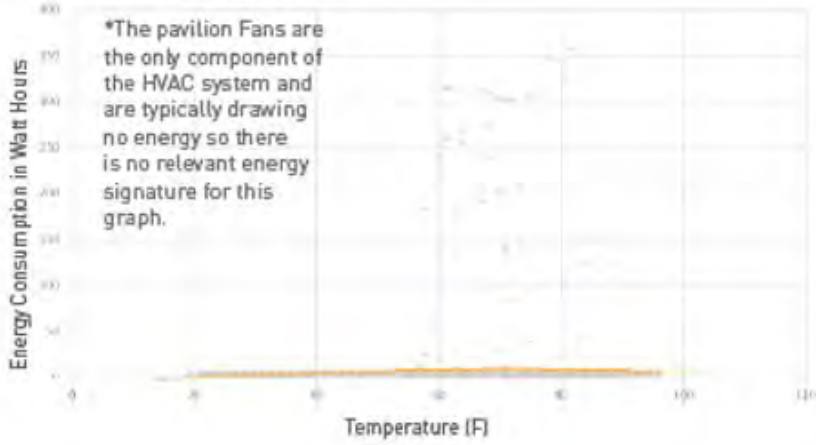
1. Monthly Energy Bills
2. Solar Provider Website / App (monthly)
3. **Advanced Energy Monitoring**







HVAC Energy Signature



Lessons Learned

HVAC as an open pavilion living building this project uses almost no energy towards HVAC and takes full advantage of passive strategies and the climate

Water in order to make net-positive water for LBC, water becomes the biggest energy consumer due to the recycle and dosing pumps, as well as UV filter and water harvesting systems. However, relative to many other building components, these all have very low energy consumption, as much as a fridge annually.

Case Study #1 – Lake Flato's Office

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Case Study #1: **Our Goal - Zero Carbon Certification**

ZERO CARBON CERTIFICATION

One hundred percent of the operational energy use associated with the project must be offset by new on- or off-site renewable energy.

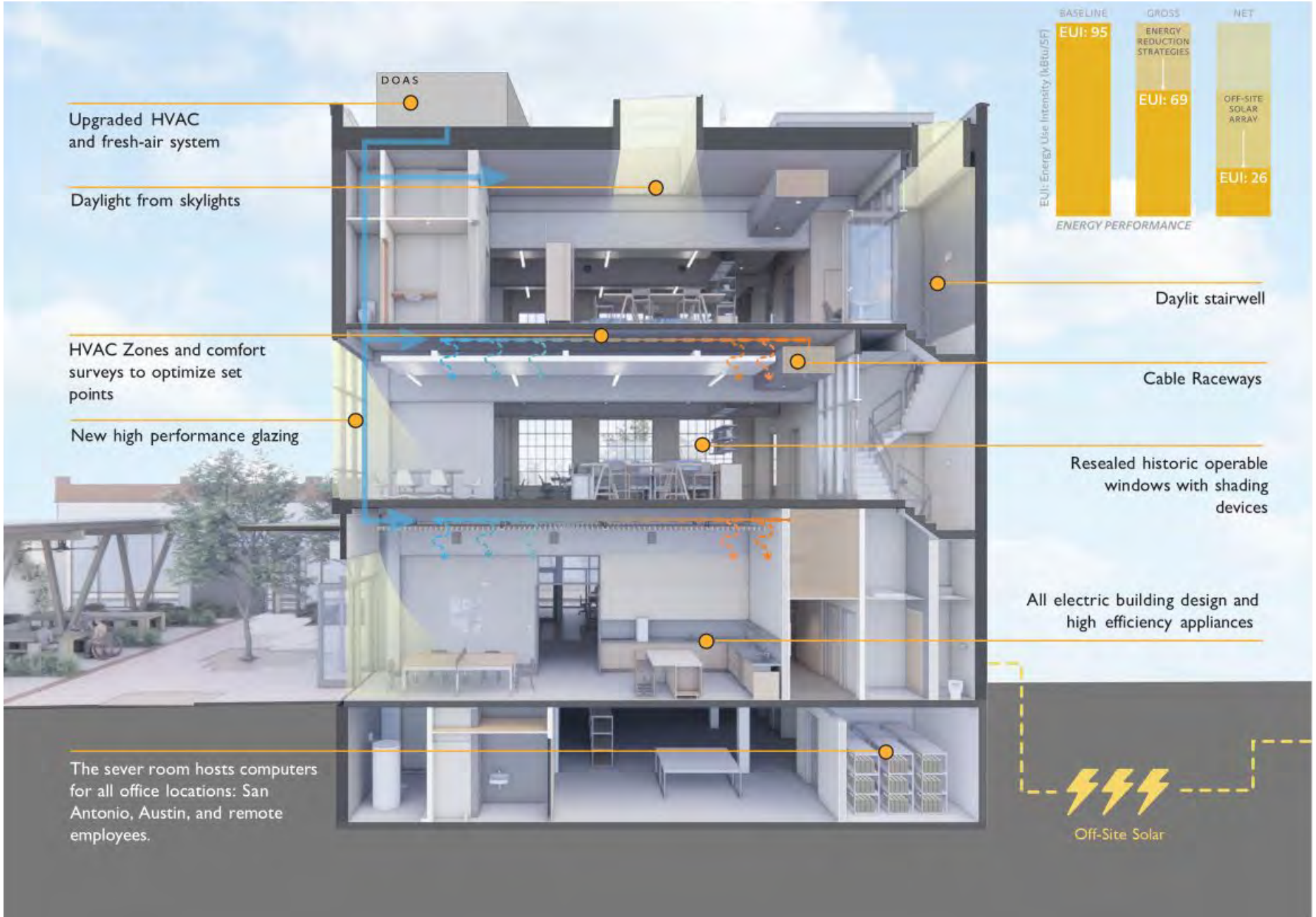
CONSUMPTION

PRODUCTION

System Size
201 kW

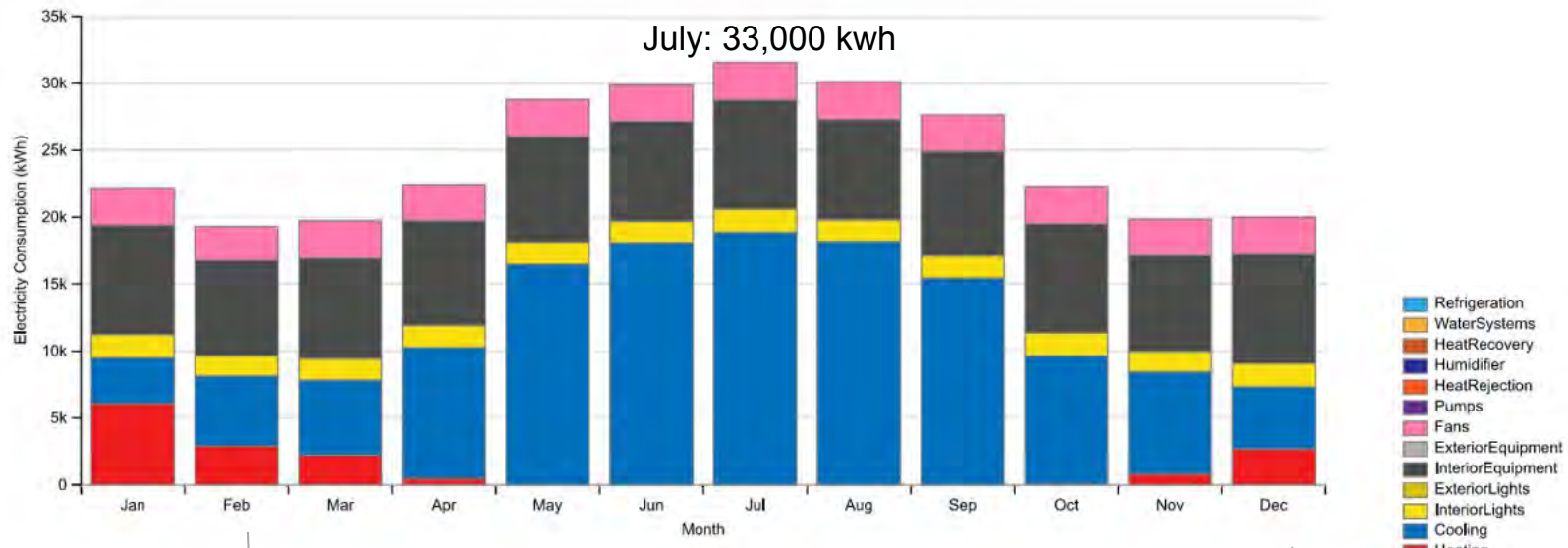
Case Study #1: **Energy Saving Strategies**

- New HVAC
- improved existing glazing
- New high performance glazing
- all electric with high efficiency appliances
- daylighting to reduce lighting needs

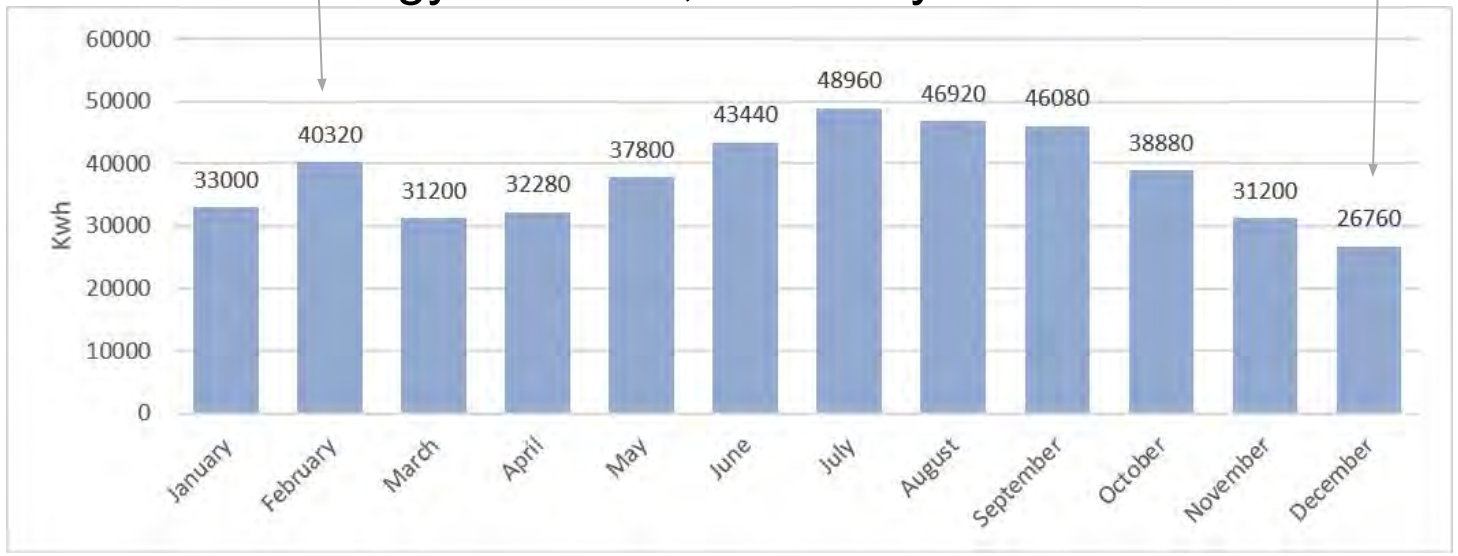


Case Study #1: **Predicted Energy Vs Actual (no solar)**

Predicted (energy model): 293,942 kwh/year



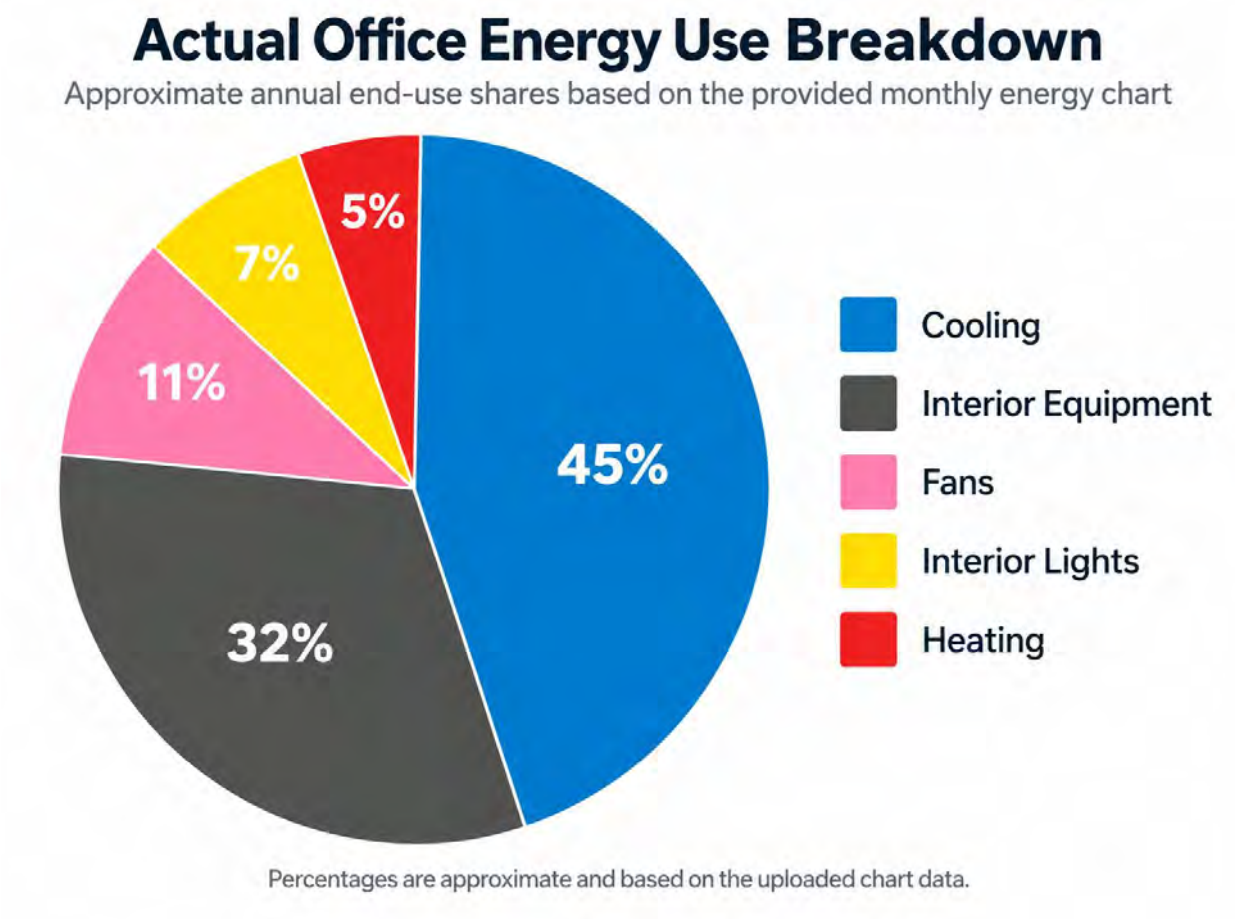
2025 Actual Energy Use: 454,320 kwh/year



Using 55% more energy than our energy model predicted!

HVAC? Fresh Air?
Computers for all offices?

Case Study #1: **What drives office energy use?**



HVAC: 50% of total use

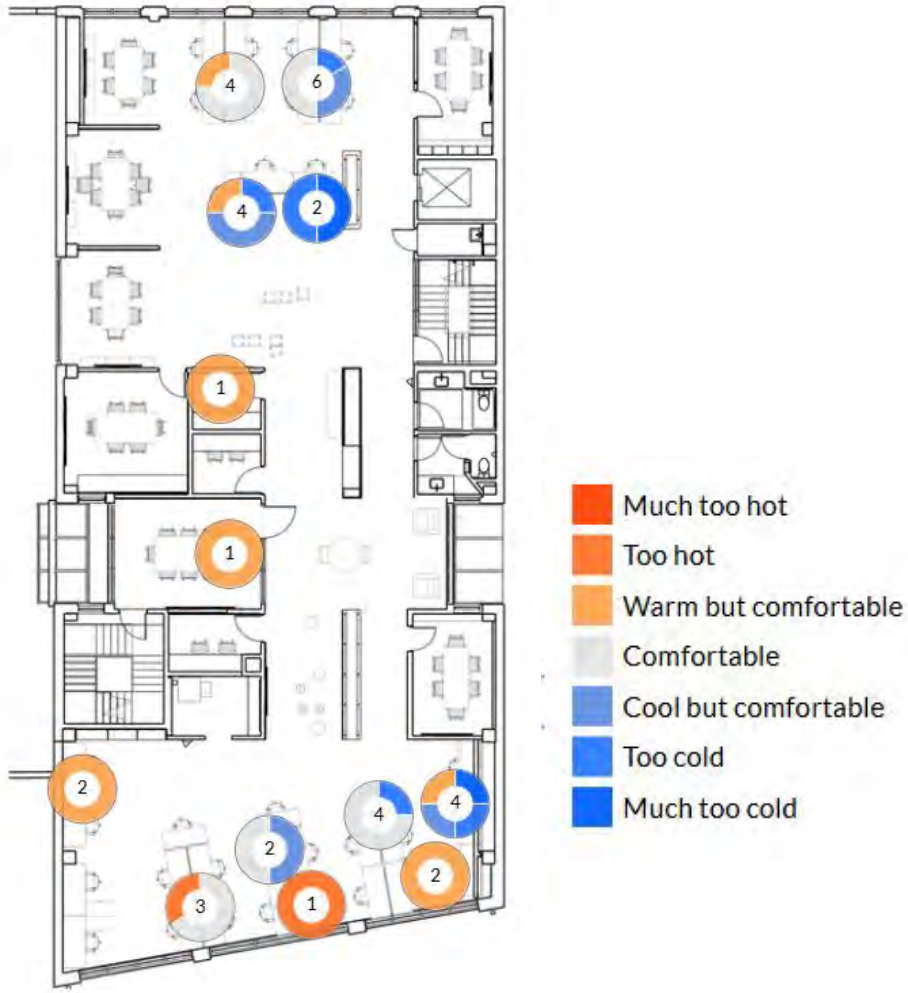
+ fans (outside air): 61%

Outside air is suspected to be a big contributor

First target: Thermal Comfort

Surveys To reduce HVAC load

Ex) Summer - 72-75F



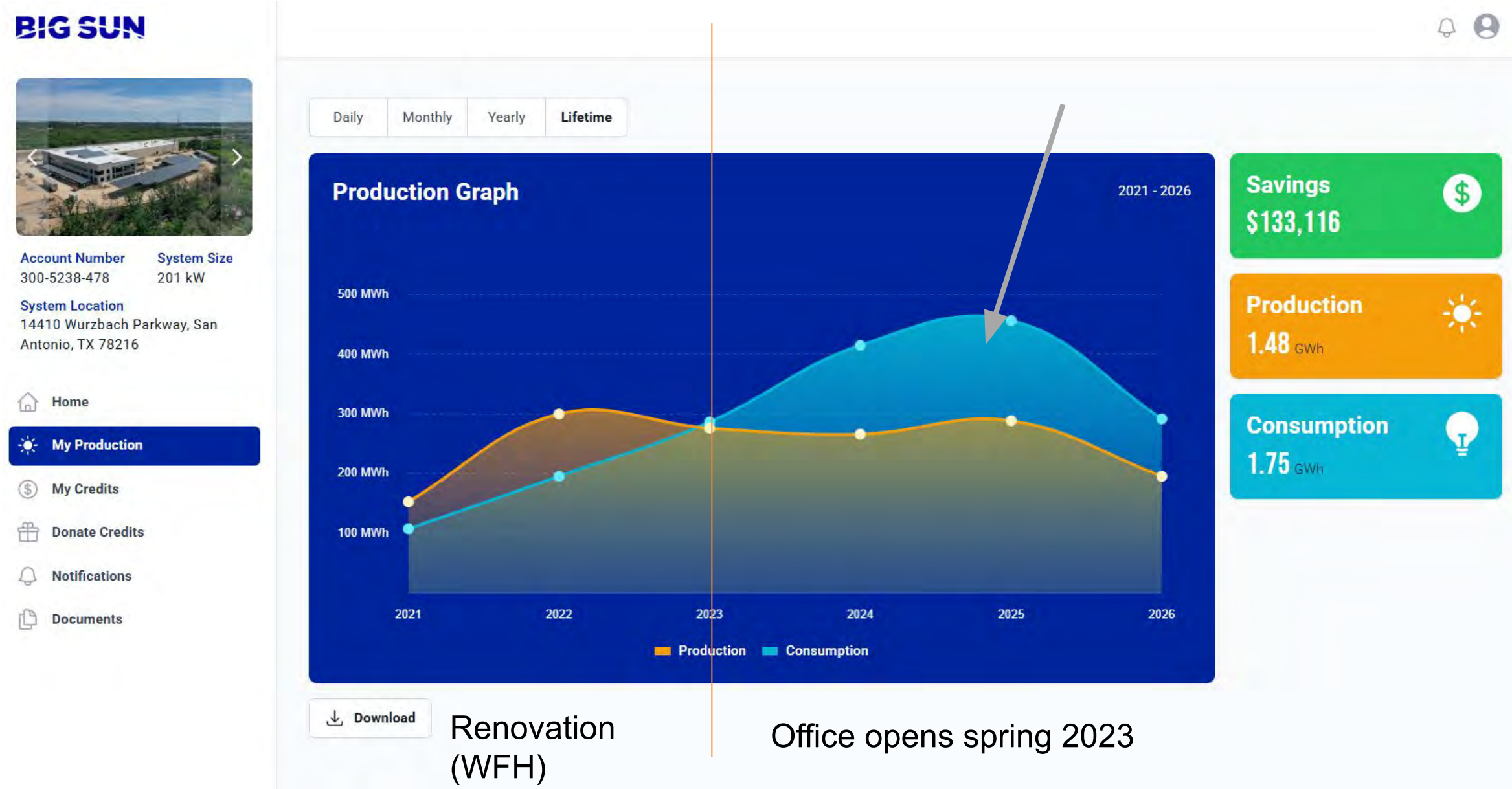
Case Study #1: **What drives office energy use?**

2nd target: Plug loads
Host computers from all 3 locations + remote

Switching to new tower workstations in our server rooms: **66% less power, 50% faster:** confirmed the drop from 1,000-watt towers to 300-watt machines“

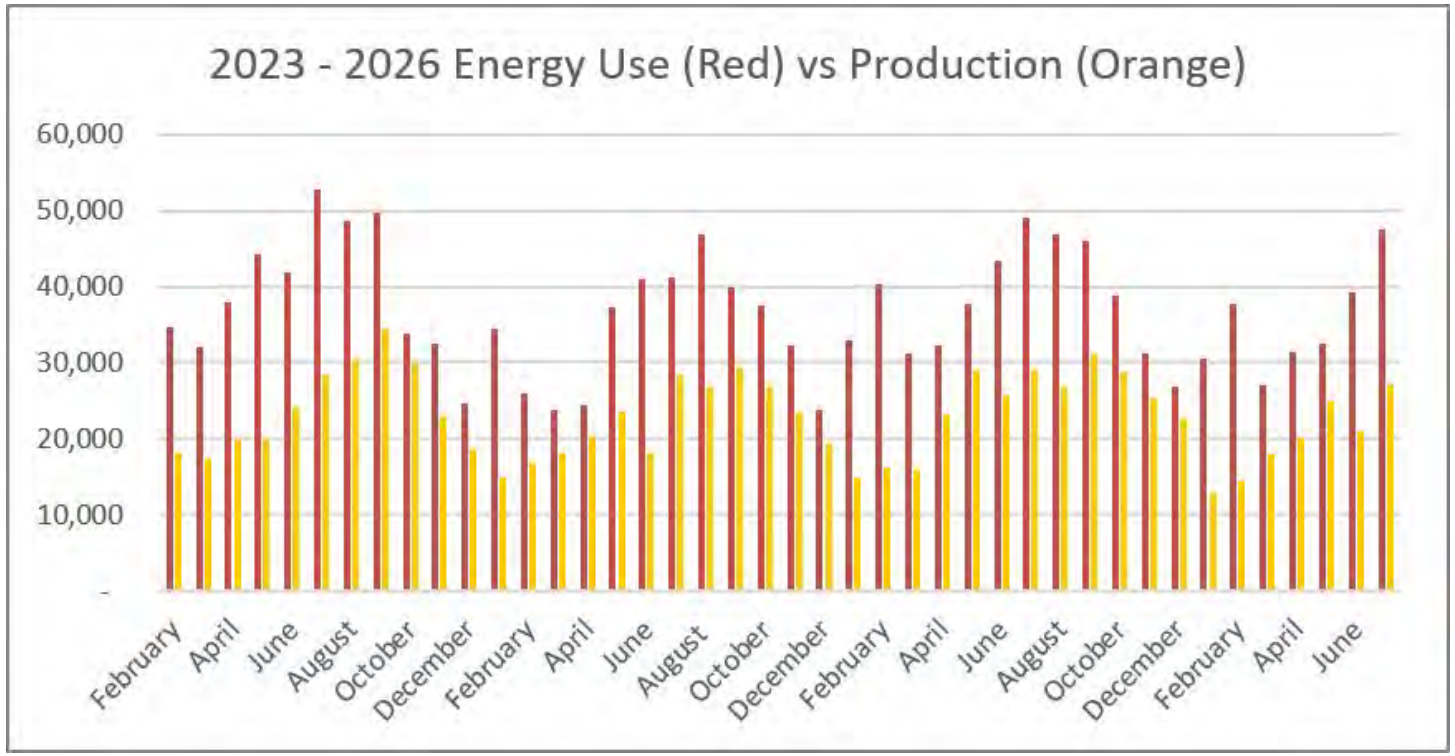
[Lake Flato’s Small Form Adoption Led to Big Performance | Dell]

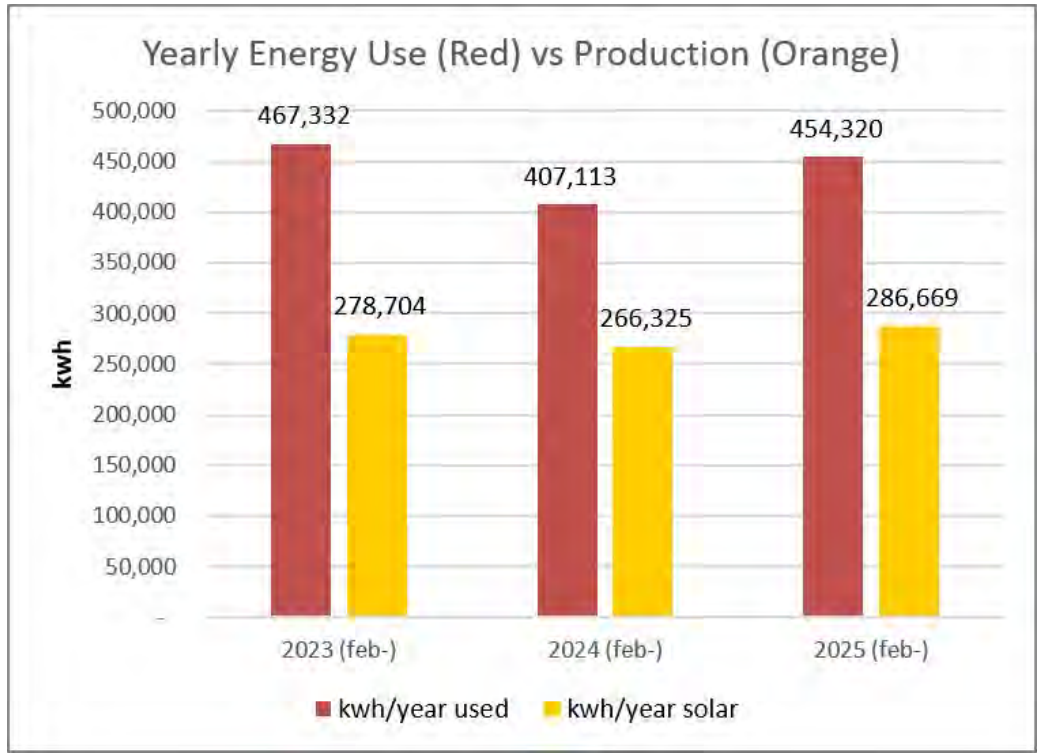
Case Study #1: **Off-site solar portal**



Case Study #1: **Net-zero progress over 3 years**

PV was sized based on the energy model to be 100% offset

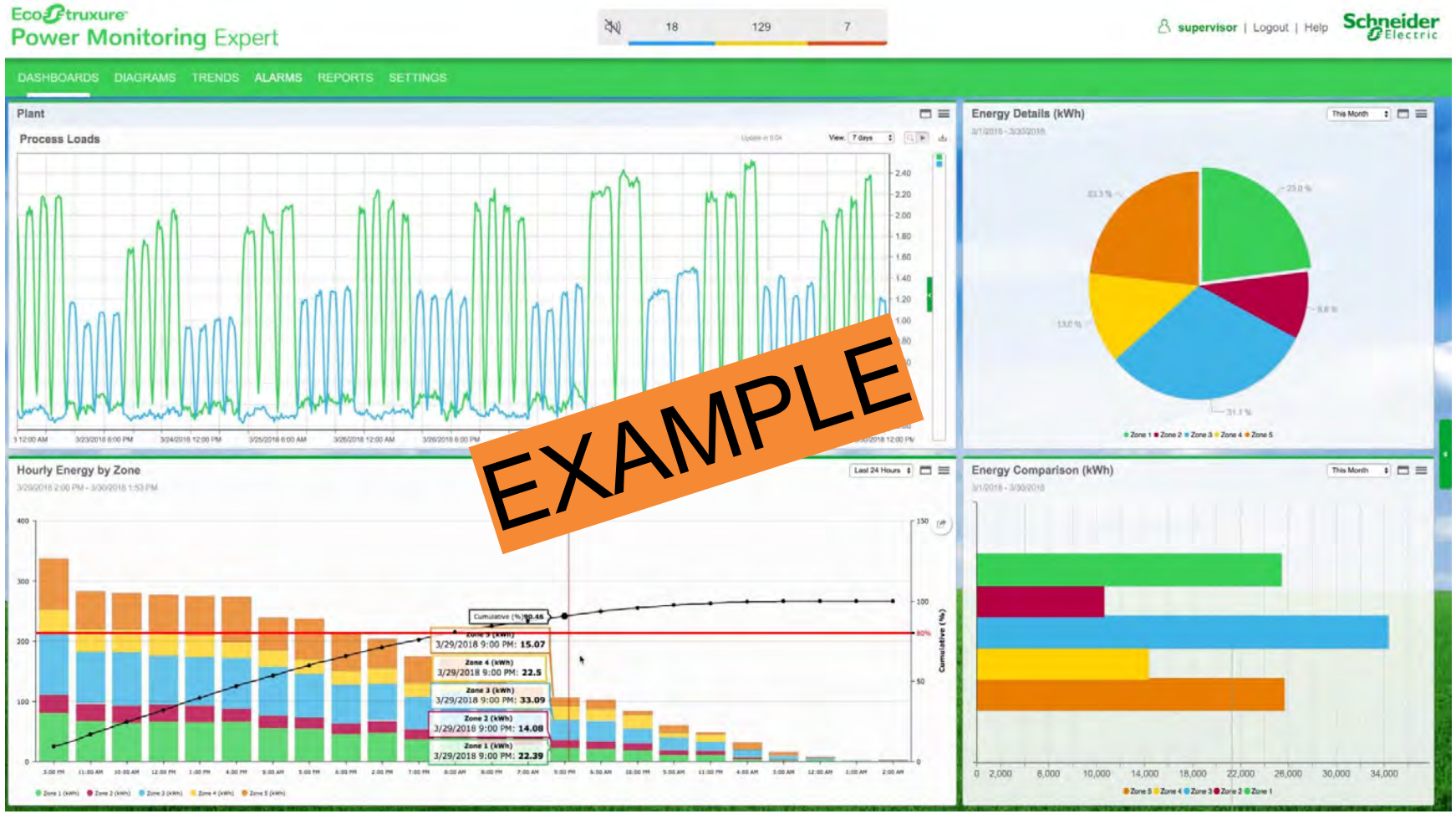




2023: 60% offset
2024: 65% offset
2025: 63% offset

Missing piece of the puzzle: advanced energy monitoring + commissioning

WHY is our energy higher than expected? Computers? HVAC? Other?



Lessons: Early specification and budgeting. All team meetings with electric engineer, contractor and subcontractors, energy monitor providers, etc. to ensure timely and well communicated install

Case Study #2 – Vickery Park Branch Library

Vickery Park Branch Library

Goals and Accomplishments:

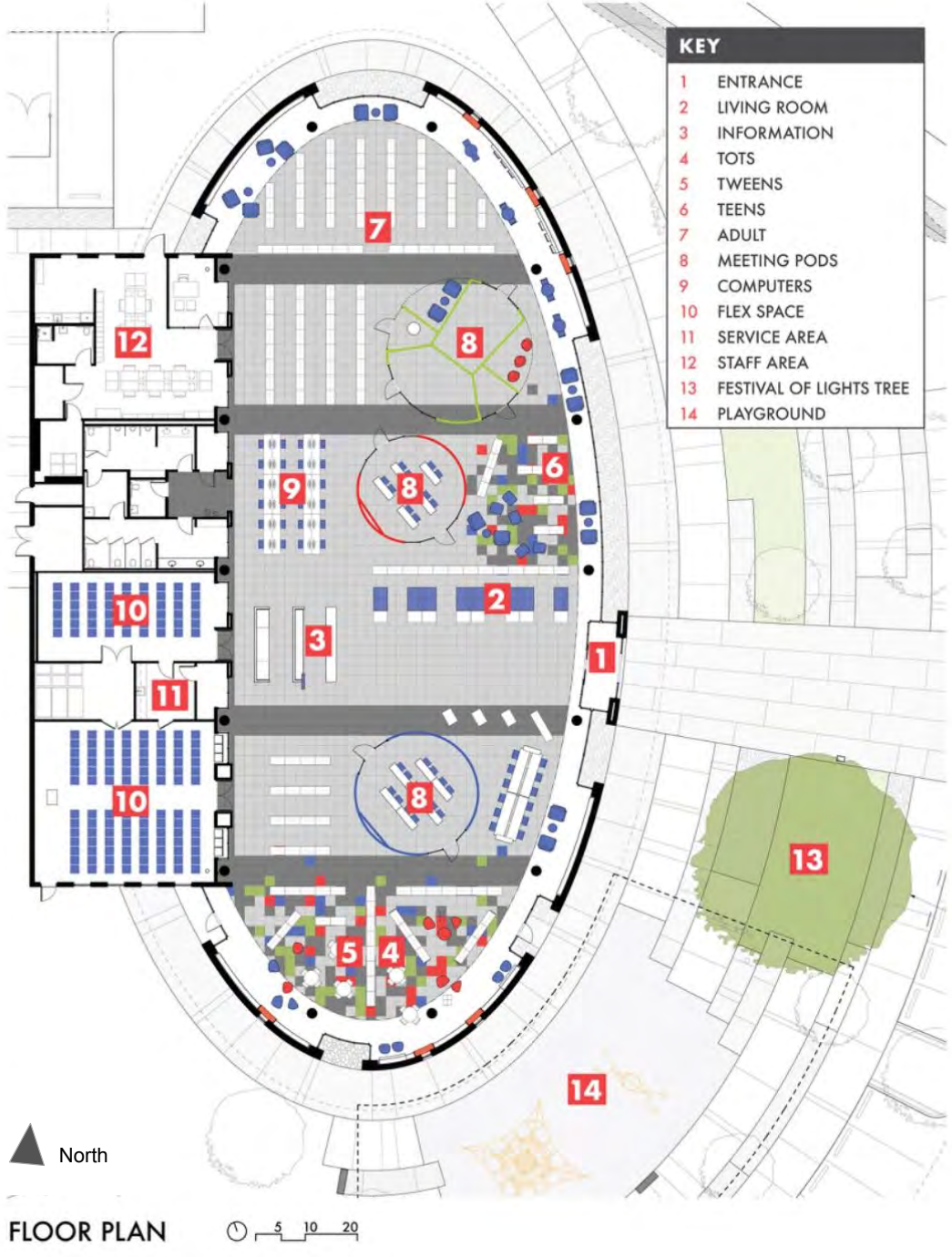
- Met the 2030 Challenge
- 100% Carbon Neutral
- Achieve LEEDv4 Gold

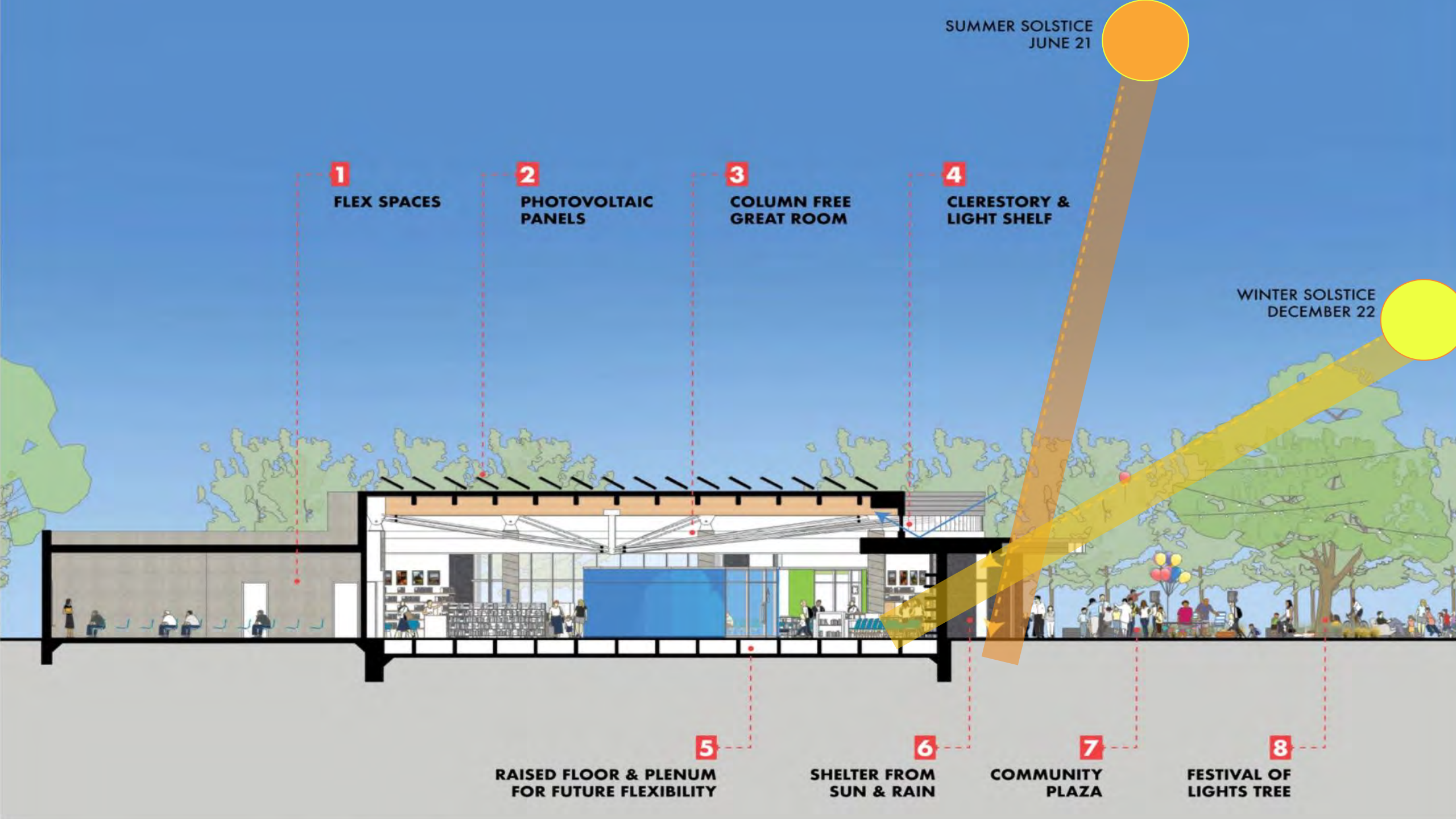
Passive Design Strategies:

- R-33 walls using Rockwool Batt and continuous Insulation around ellipse walls
- R-37 insulated roof
- continuous clerestory with light-shelfs to bring in natural daylight
- careful orientation of windows for natural daylighting without heat gain
- large continuous 8’ deep overhang
- high albedo roof white TPO roof

Active Systems Strategies:

- 100% LED lighting with daylighting sensors
- underfloor air distribution with movable registers
- high efficiency HVAC system
- electric insta-hots
- no natural gas or fossil fuels



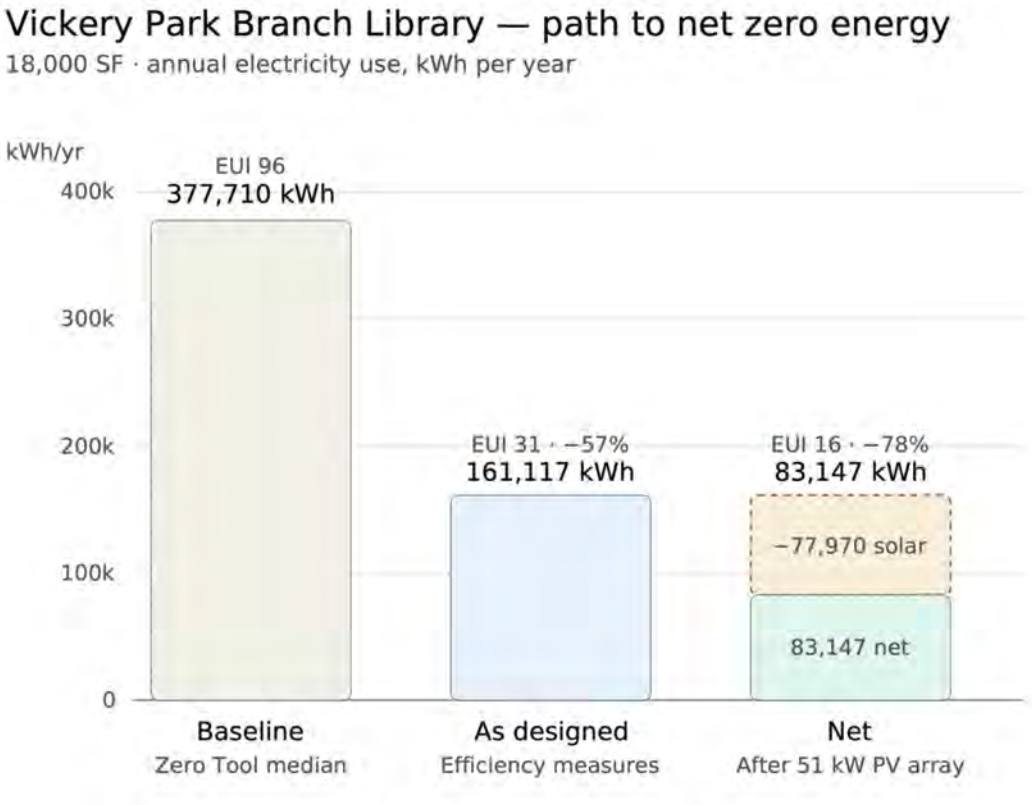

SUMMER SOLSTICE
JUNE 21
WINTER SOLSTICE
DECEMBER 22
1
FLEX SPACES
2
PHOTOVOLTAIC PANELS
3
COLUMN FREE GREAT ROOM
4
CLERESTORY & LIGHT SHELF
5
RAISED FLOOR & PLENUM FOR FUTURE FLEXIBILITY
6
SHELTER FROM SUN & RAIN
7
COMMUNITY PLAZA
8
FESTIVAL OF LIGHTS TREE


SPAIN MICRONESIA
MARSHALL ISLANDS
THE CAYMAN ISLANDS
PERU LITHUANIA BAHRAIN
HAITI TUNISIA MALAYSIA
AFGHANISTAN ALGERIA MALTA
VENEZUELA SAUDI ARABIA
RWANDA
GRENADA CHINA
BELGIUM
AUSTRALIA LIBYA
FRY BREAD

Vickery Park Branch Library
achieves all Renewable Points

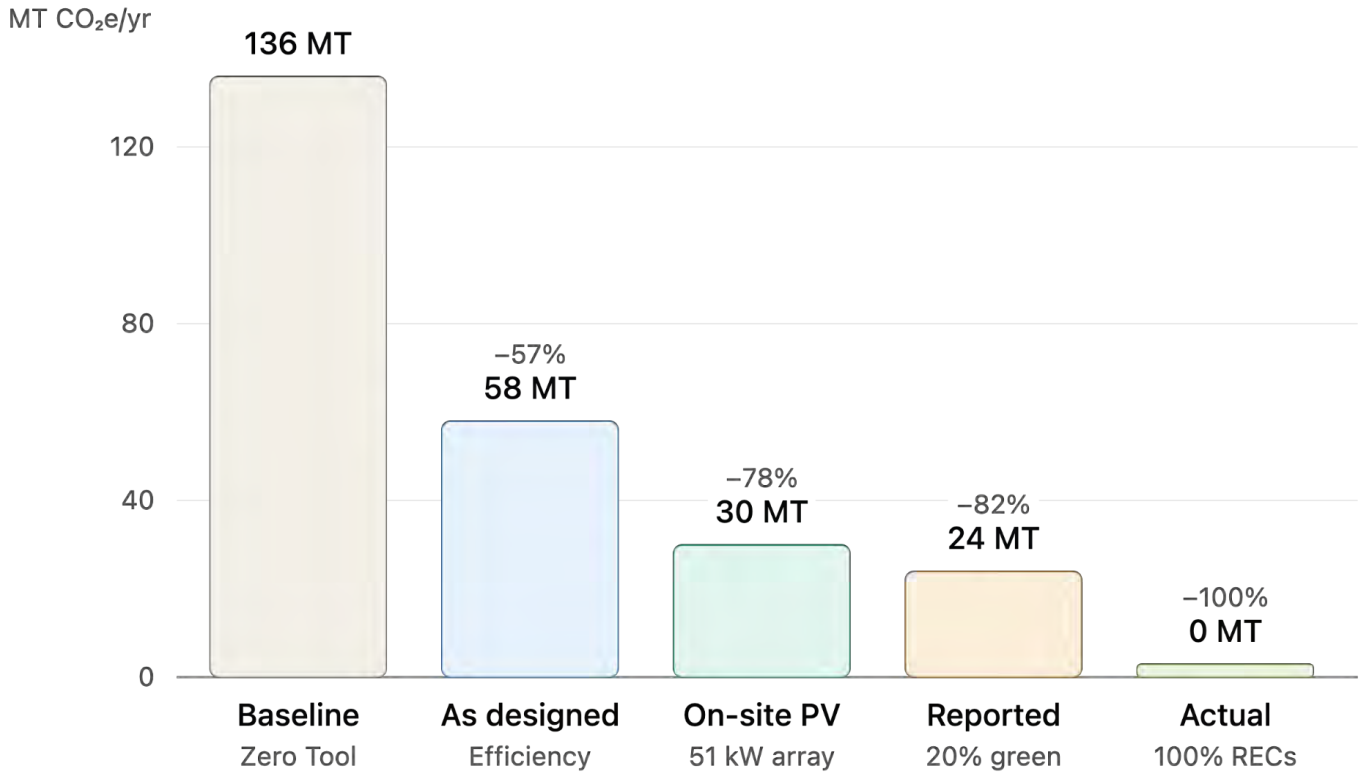
140 Photovoltaic Panels at 365W = 51.1 KW
all 3 points for 23% energy reduction
+1 point for exemplary performance
+1 bonus point for regional priority

Energy Reduction ~ close to NZE



Operational Carbon Neutral

MT = Metric tons
1,000 kg, or about 2,205 lb. So the baseline 136 MT is 135,976 kg CO_2e per year.



Case Study #3 - Foundation Communities

Lakeline Station Learning Center - 2017

Living Future Living Building Challenge

Goals and Accomplishments:

- ILFI Zero Energy Project
- AEGB 5 Star
- Third Zero Energy Project in Texas, first in Austin

Living Building Design Strategies

- Net Zero Energy Petal
- Continuous Rigid Insulation
- “Structure as Finish’ Design
- Safer building materials - Red List Free

Active Systems Strategies:

- 100% LED lighting with abundant daylighting
- High Efficiency ERV HVAC system
- 70kW Solar + future backup BESS
- Big ceiling fan
- HVAC condensate and rainwater provide 95% of water to the building
- Heat Pump hot water
- Edible gardens
- No natural gas

Living Future Living Building Challenge

Long Term Operation Questions

- How much will the solar reduce electricity costs for the building?
- How durable are the materials?
- How many maintenance calls does the LC receive?

Positive Impacts

- Maintenance costs remain low
- Winter Storm Uri - onsite resilience hub
- All savings go back to services at the property
- Indoor Air Quality
- EUI Average: 4.19

Challenges

- Solar inverters caused decline in solar production
- HVAC maintenance costs
- Educating staff
- Thermostats
- Plant care is extremely time intensive

Carbon / Electrification & A Year in Review

Session 10
October 13th

Questions and Discussion