LARRY STRAIN, FAIA, LEED AP
PRINCIPAL, SIEGEL & STRAIN ARCHITECTS

SUSI MARZUOLA, AIA, LEED BD+C
PRINCIPAL, SIEGEL & STRAIN ARCHITECTS

ALLISON HYATT, RA
PROJECT ARCHITECT, SIEGEL & STRAIN ARCHITECTS

LAURA LEVENBERG, AIA, LEED BD+C
PROJECT ARCHITECT, SIEGEL & STRAIN ARCHITECTS

Learning Objectives

Reuse and Transform

Review how building renovation and reuse can address reductions in operational energy and associated GHG emissions in existing buildings and reductions in embodied carbon and associated GHG emissions resulting from new construction.

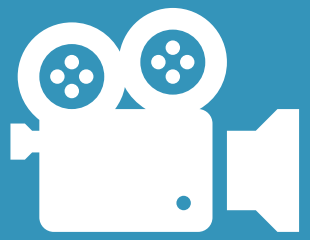
Explore how building renovation and reuse strengthens neighborhoods, maintains diversity, builds equity, increases resilience, and improves thermal comfort, and health.

See how the CARE Tool can be used in early design phases to estimate operational and embodied carbon emissions associated with reusing a building compared to construction.

Walk through examples of building renovation and reuse in the work of Siegel & Strain and see how they demonstrate the firm's commitment to design excellence that improves social equity, repairs communities, and reduces greenhouse gas emissions from buildings.

AIA Continuing Education Provider

Housekeeping Reminders



A recording of today's presentation will be made available on our website

Today's session qualifies for 1.5 AIA HSW/LU & 1.5hrs of ZNCD

Please use the Q&A function to ask questions for today's presenters

Cultivate a positive learning environment

MODERATOR/ SPEAKER

LARRY STRAIN, FAIA, LEED AP

PRINCIPAL, SIEGEL & STRAIN ARCHITECTS

SPEAKER

SUSI MARZUOLA, AIA, LEED BD+C

PRINCIPAL, SIEGEL & STRAIN ARCHITECTS

SPEAKER

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SPEAKER

LAURA LEVENBERG, AIA, LEED BD+C

PROJECT ARCHITECT, SIEGEL & STRAIN ARCHITECTS

Reuse & Transform

Why reusing and upgrading existing buildings benefits the climate and community. Siegel & Strain Architects will present three recent and current reuse projects and discuss process, opportunities, and benefits, as well as challenges and lessons learned. The carbon impacts will be evaluated using the recently launched CARE Tool.

Learning Objectives

At the conclusion of the program participants will have:

- Gained an overview understanding of how building renovation and reuse can address two fundamental issues simultaneously: the need to **reduce operational energy** and associated greenhouse gas emissions in existing buildings and to **reduce the embodied carbon** and associated greenhouse gas emissions resulting from new construction.
- Heard and seen how **building renovation and reuse strengthens neighborhoods**, maintains diversity, builds equity, increases resilience, and improves thermal comfort, and health.
- Acquired **familiarity with how the CARE Tool estimates the avoided operational and embodied carbon emissions** associated with reusing and upgrading a building or replacing it with new construction and can be used in a pre- or early-design, high-level assessment of the total emissions impact of building reuse versus replacement.
- Understood **examples of building renovation and reuse in the work of Siegel & Strain** and how it is key to the firm's commitment to design excellence that improves social equity, enhances communities, and reduces greenhouse gas emissions from buildings.

Overview

01 Context

02 Berkeley Hillel

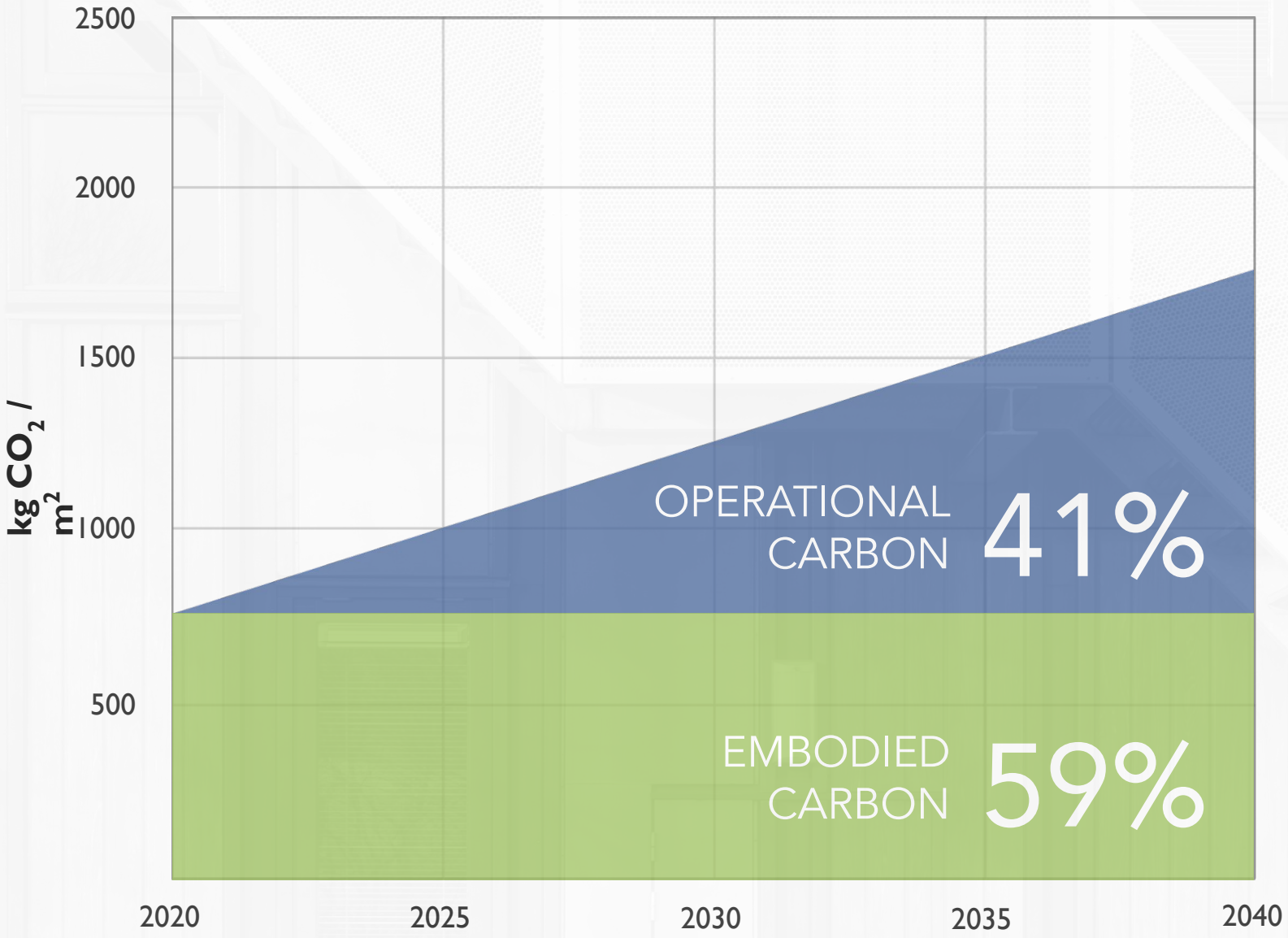
03 Boys and Girls Club

04 Oakland EcoBlock

05 Key Takeaways

The greenest building is one that's already built.

Carbon Footprint: Average New Building



Within urban environments, existing buildings are typically responsible for the majority of emissions.

New York City	71%	Mumbai	60%
Seoul	63%	Beijing	53%
Boston	73%	Copenhagen	76%
London	69%	Chicago	71%
Washington DC	76%	Bellingham	43%

Source: UN Habitat, Paulson Inst., city data, etc.

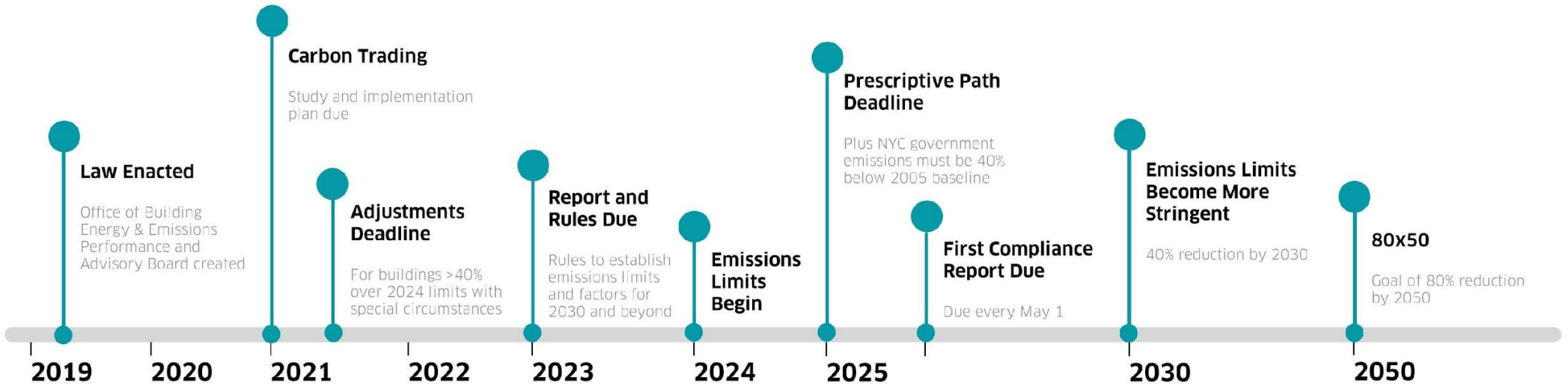
architecture 2030

In 2040, **2/3 of the global building stock** will be buildings that exist today.
Without upgrades, they will still be emitting GHGs.

Data Source: IEA Energy Technology Perspectives 2020, February 2021 Revised Edition

Local Law 97 - New York

Mandatory building performance standards.



FSR. "Local Law 97: Energy Grades & Emissions Compliance." Accessed May 2, 2022. https://www.fsresidential.com/new-york/news-events/articles-and-news/lowcal-law-97-updates-building-energy-grades-emissi/

Existing Building Stock

RESIDENTIAL [1]

1. single-family, detached
2. apartments, 5+ units
3. apartments, 2-4 units
4. single-family, attached
5. mobile homes

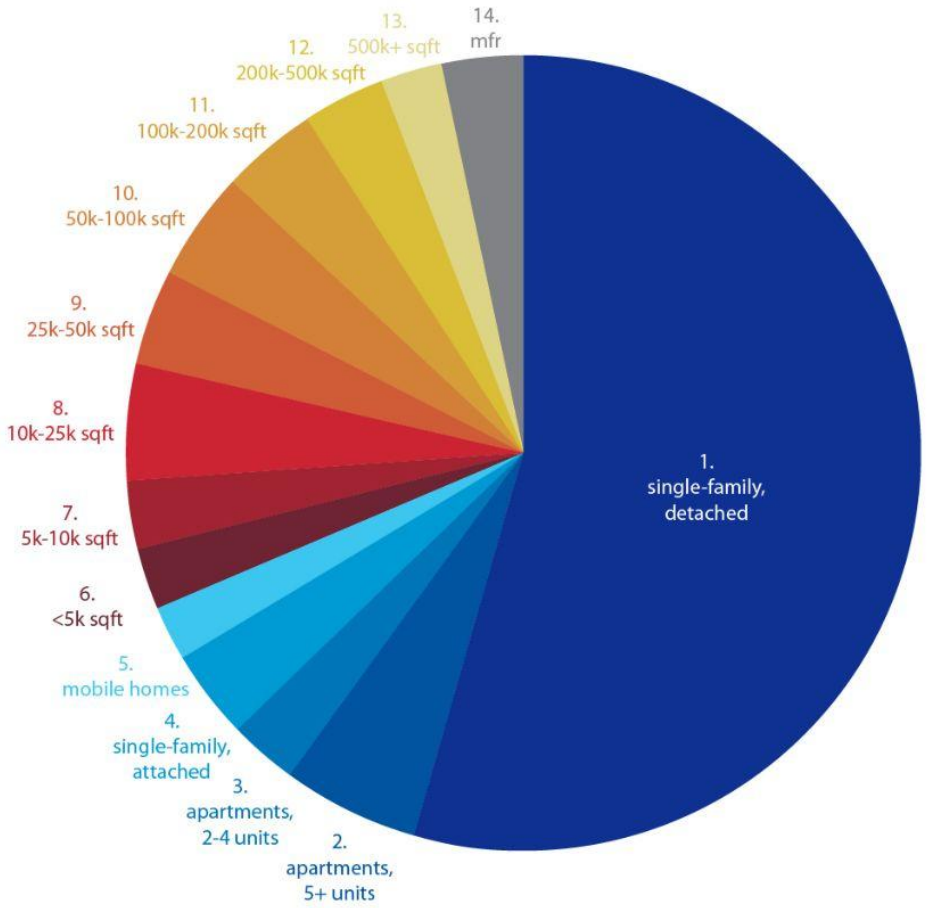
COMMERCIAL [5]

6. commercial, <5k sqft
7. commercial, 5k-10k sqft
8. commercial, 10k-25k sqft
9. commercial, 25k-50k sqft
10. commercial, 50k-100k sqft
11. commercial, 100k-200k sqft
12. commercial, 200k-500k sqft
13. commercial, 500k+ sqft

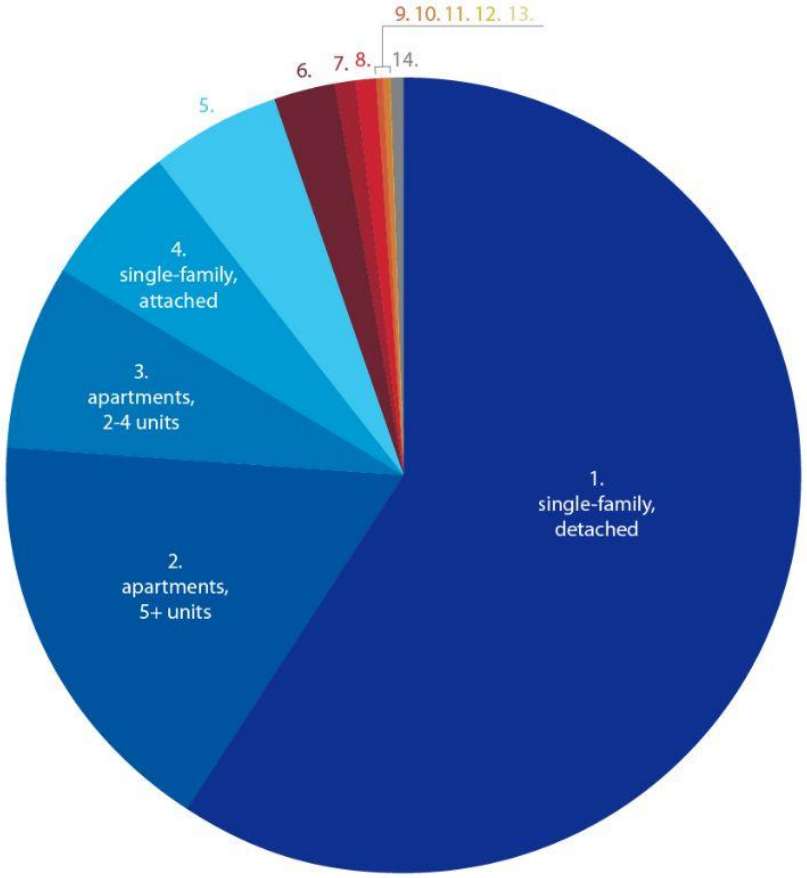
MANUFACTURING [6]

14. manufacturing

By Floor Area



By Number of Buildings



Data from RECS 2015, CBECS 2018, and MECS 2018

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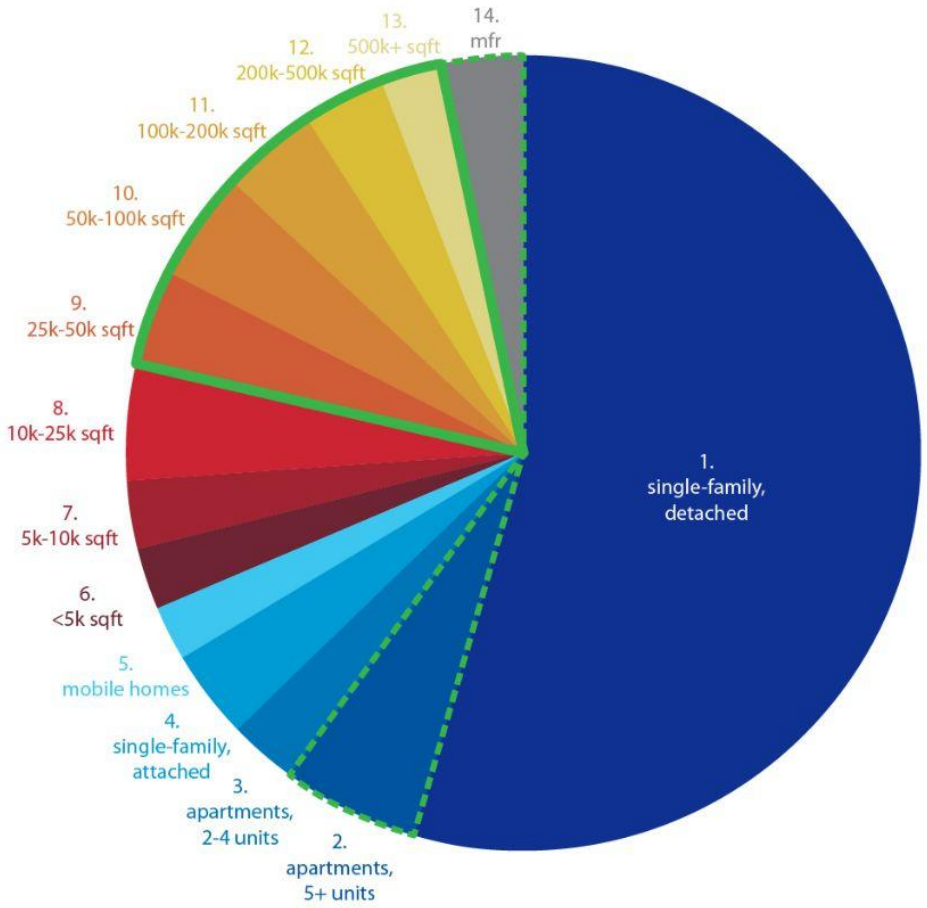

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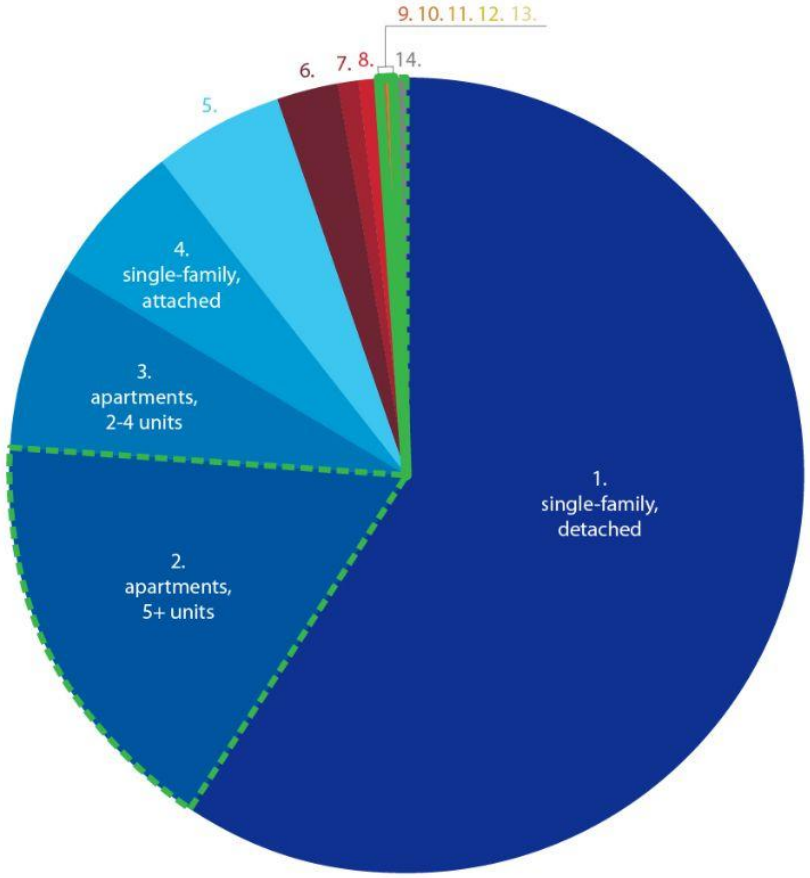

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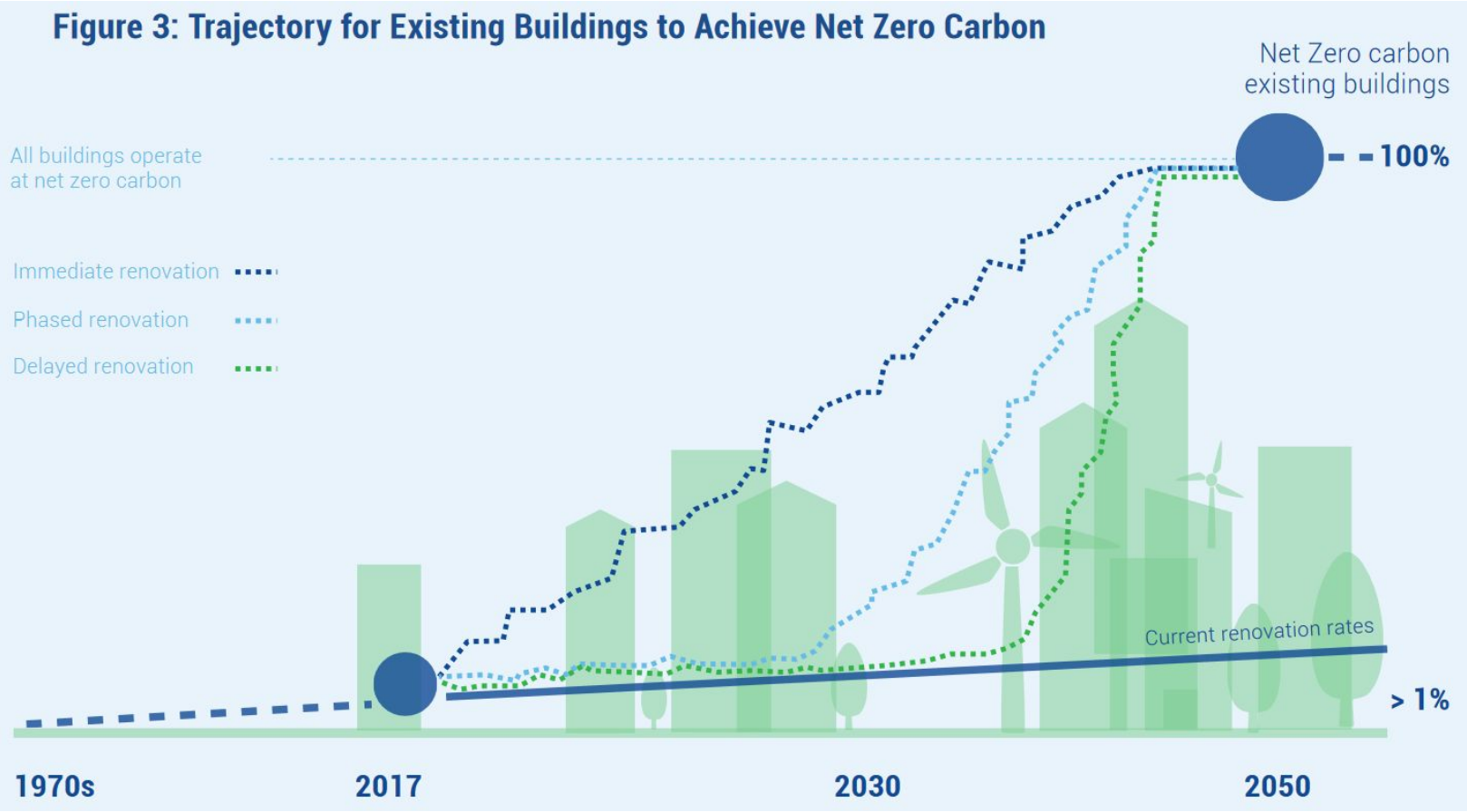
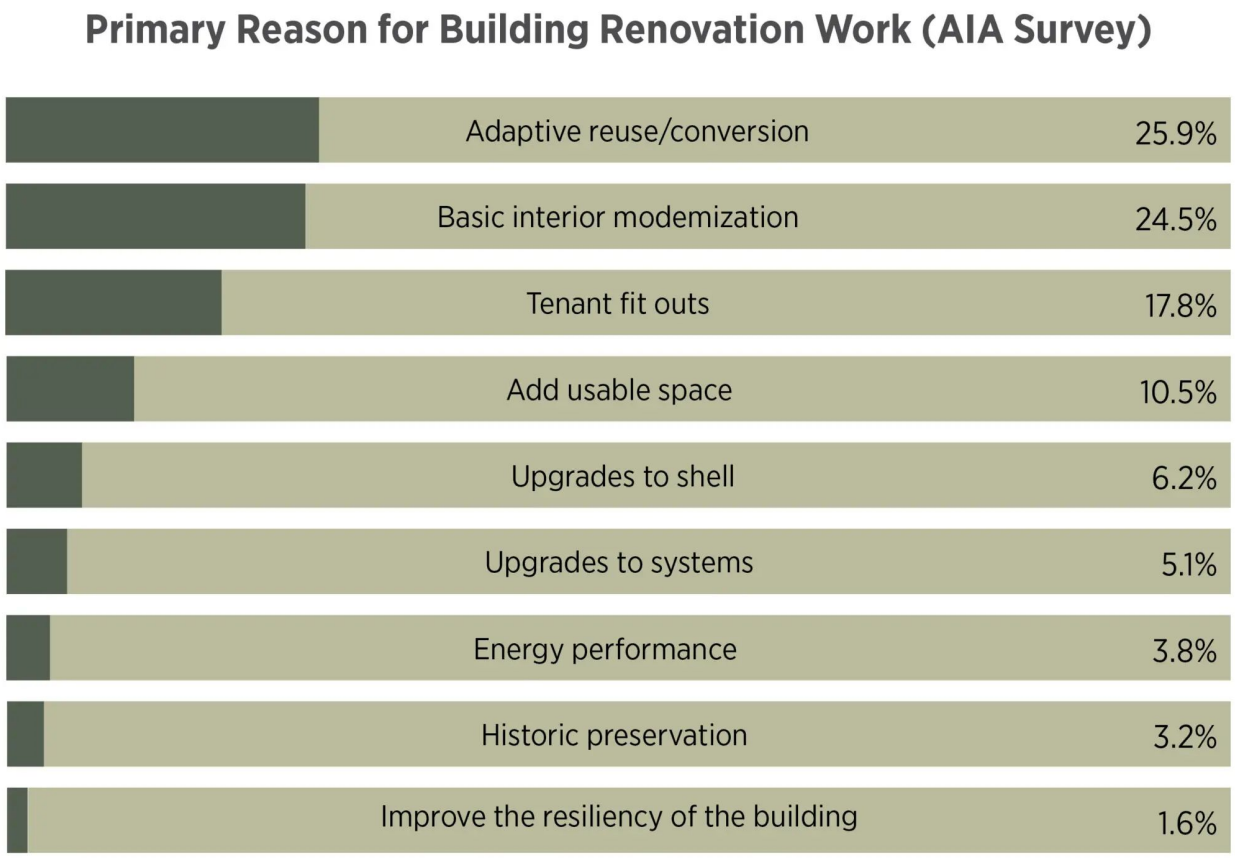
Current Renovation Rates



Laski, Jonathan, and Victoria Burrows. "From Thousands to Billions - Coordinated Action towards 100% Net Zero Carbon Buildings By 2050." World Green Building Council. Accessed September 8, 2023. https://worldgbc.org/article/from-thousands-to-billions-coordinated-action-towards-100-net-zero-carbon-buildings-by-2050/.

Opportunities for AEC Professionals



Source: AIA-Work-on-the-Boards survey, April 2022

Why invest in building reuse?

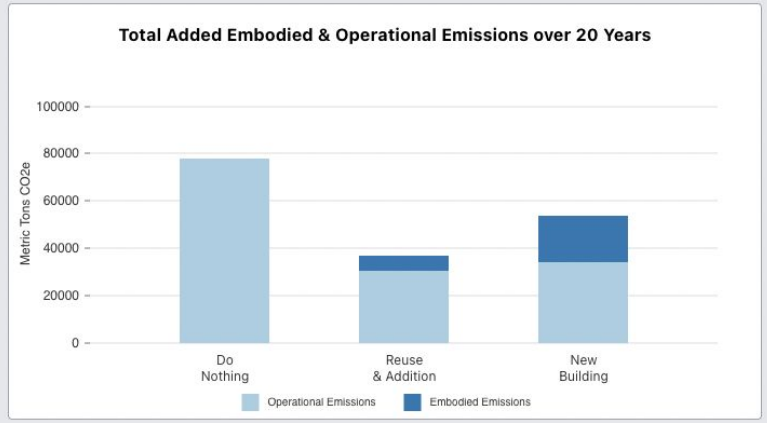
1. Improve environmental performance.
2. Invest in existing communities.
3. Reduce cost.

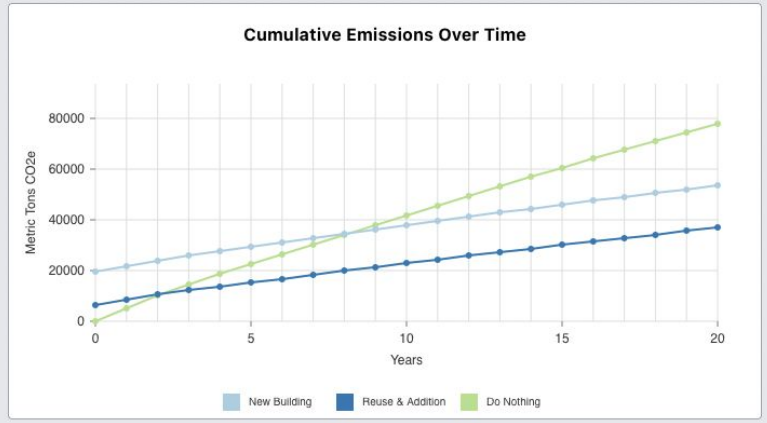
The greenest building is one that's already built.

The greenest building is one that's been retrofitted.

CARBON AVOIDED RETROFIT ESTIMATOR

RESULTS





	DO NOTHING	REUSE & ADDITION	NEW BUILDING
Embodied Emissions (Metric Tons CO2e, cradle to gate)	N/A	6524	19536
Operational Emissions (Metric Tons CO2e / 20 years)	78132	30472	34183
Total Emissions (Metric Tons CO2e / 20 years)	78132	36996	53719
Total Emissions Intensity ($kgCO_2e/ft^2$ / 20 years)	145	69	100

https://caretool.org/

the CARE TOOL

CARBON
AVOIDED:
RETROFIT
ESTIMATOR

caretool.org

What it Does

Evaluates total carbon emissions and benefits of existing building reuse compared to replacement new construction.

Who it's For

- Planners
- Heritage officers
- Building owners
- Developers
- Building industry professionals
- Educators

architecture 2030

the CARE TOOL

CARBON AVOIDED: RETROFIT ESTIMATOR

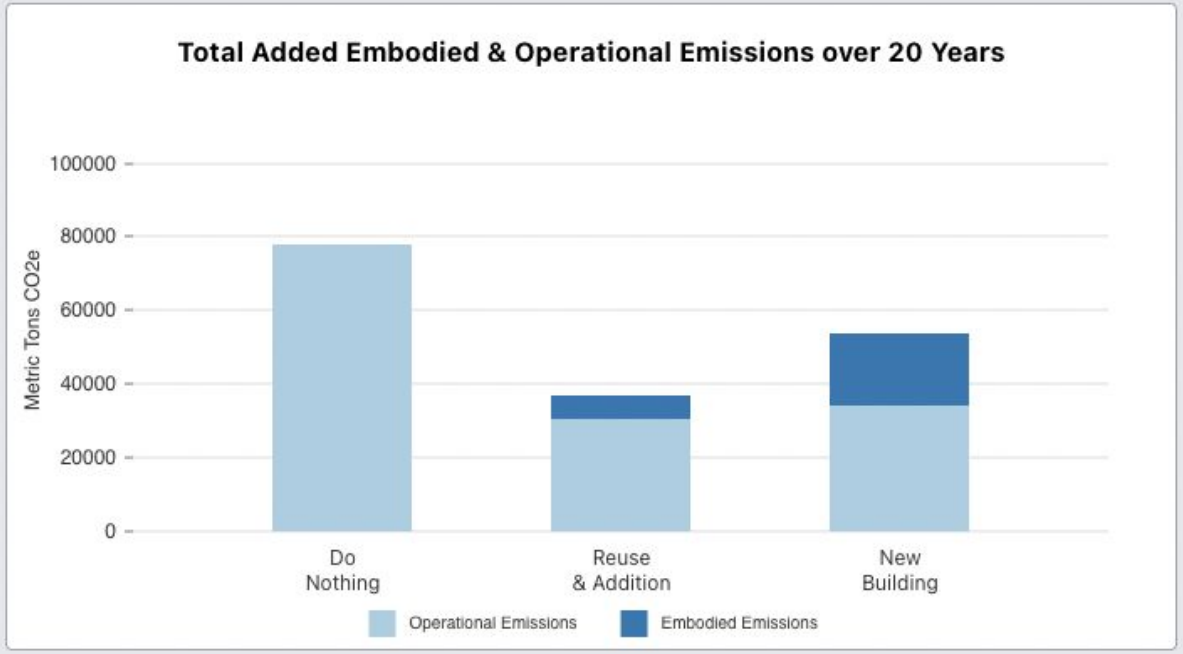
caretool.org

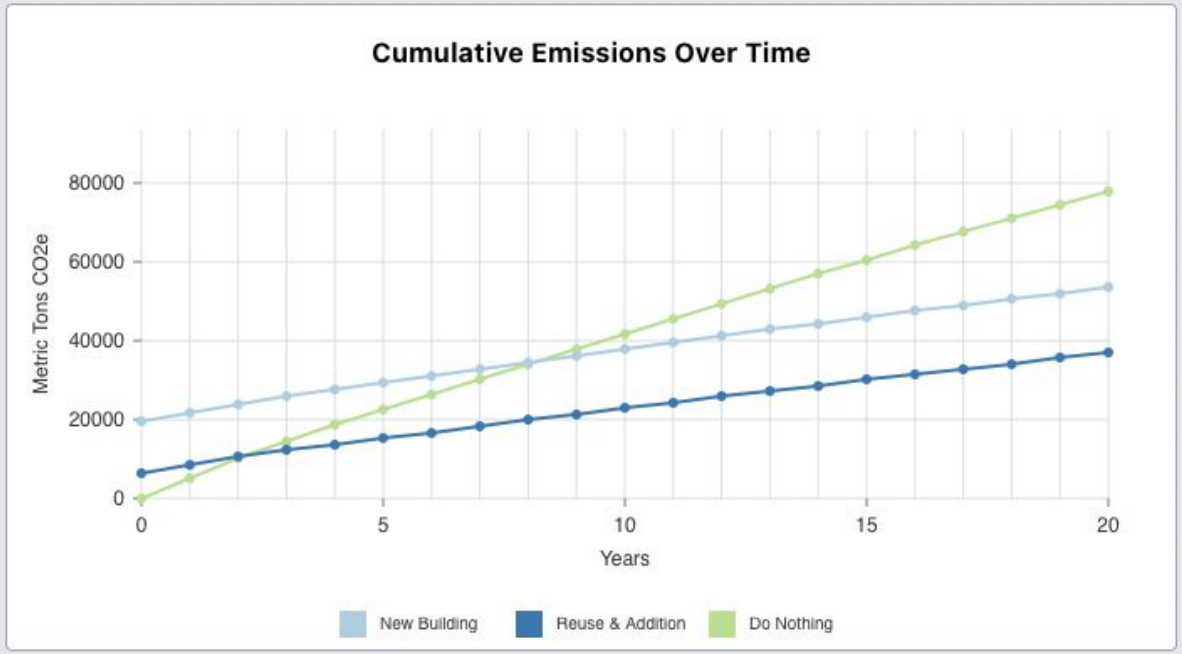
CARE Tool Taxonomy

General Information	Existing Building	Building Reuse	New Building
Location - Climate	Building Size and Height	Changes to Size and Use	Size and Use
Grid Emissions	Building Structure	Targeted EUI (Operational Carbon)	Targeted EUI (Operational Carbon)
Modeled Timeframe	Building Use	Reuse Scope (Embodied Carbon)	Building Type (Embodied Carbon)
	Current Energy Use (EUI	Structural	Wood
		Envelope	Hybrid Wood + Concrete/Steel
		Interiors	Concrete/Steel
		MEP	
		Addition	

architecture 2030

Results





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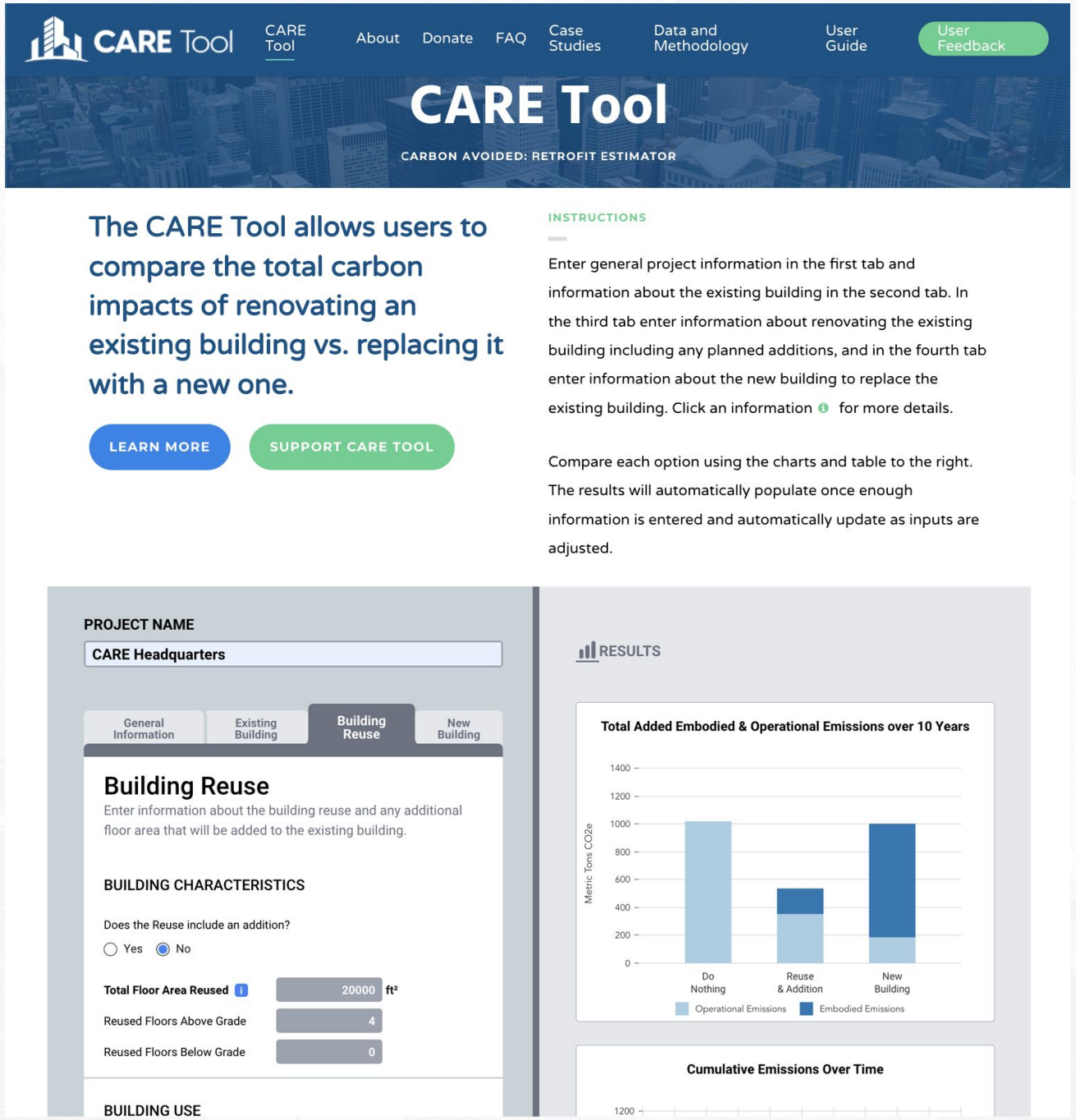
caretool.org



Berkeley Hillel

Jewish student center adjacent to the University of California, Berkeley

- 14,300 sf existing building
- Originally constructed in the 1950s
- Renovation reconfigured offices, meeting rooms, auditorium, and collaborative workspaces

Before and After

Community

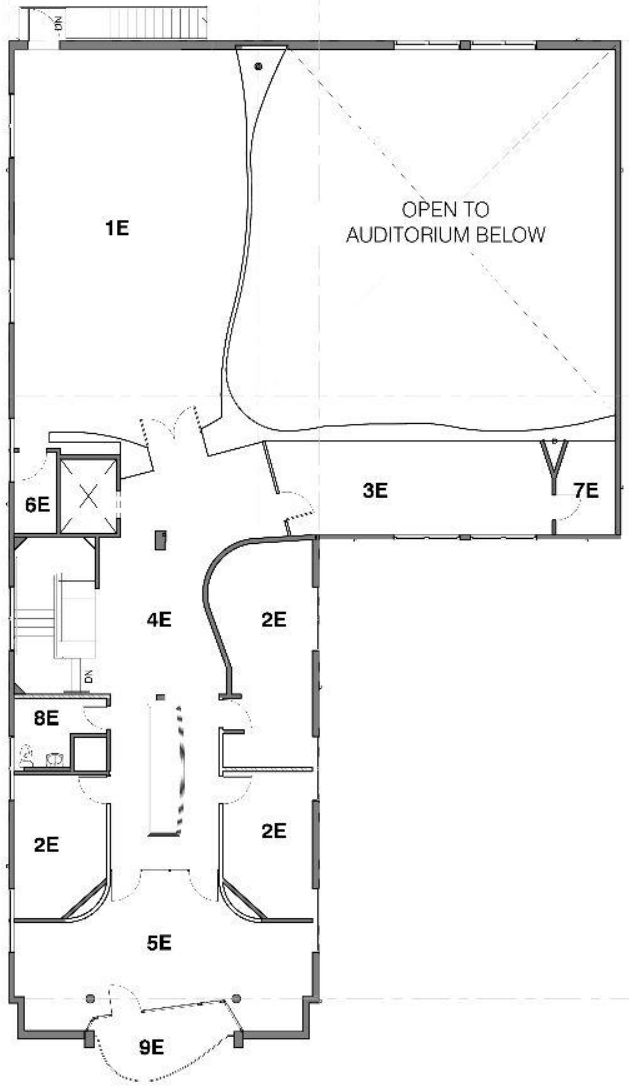
Siegel & Strain engaged with the students and staff to understand how they envisioned the building transformation.

- Student listening
  - Valued gathering spaces and spaces that provided a connection to the outdoors
- Staff programming
  - Desire to empower students
  - Enable the organization to serve more people in years to come.
- Board meeting, task force
- Public events

Before

BEFORE - LEVEL 3 FLOOR PLAN

- **1E** CHAPEL
- **2E** PRIVATE OFFICE
- **3E** STUDENT OFFICE
- **4E** CIRCULATION
- **5E** LOUNGE
- **6E** MECHANICAL ROOM
- **7E** STORAGE
- **8E** ALL-GENDER RESTROOM
- **9E** BALCONY



After

AFTER - LEVEL 3 FLOOR PLAN

- **1** CHAPEL
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- **10** SEATING NOOK
- **11** MEETING ROOM
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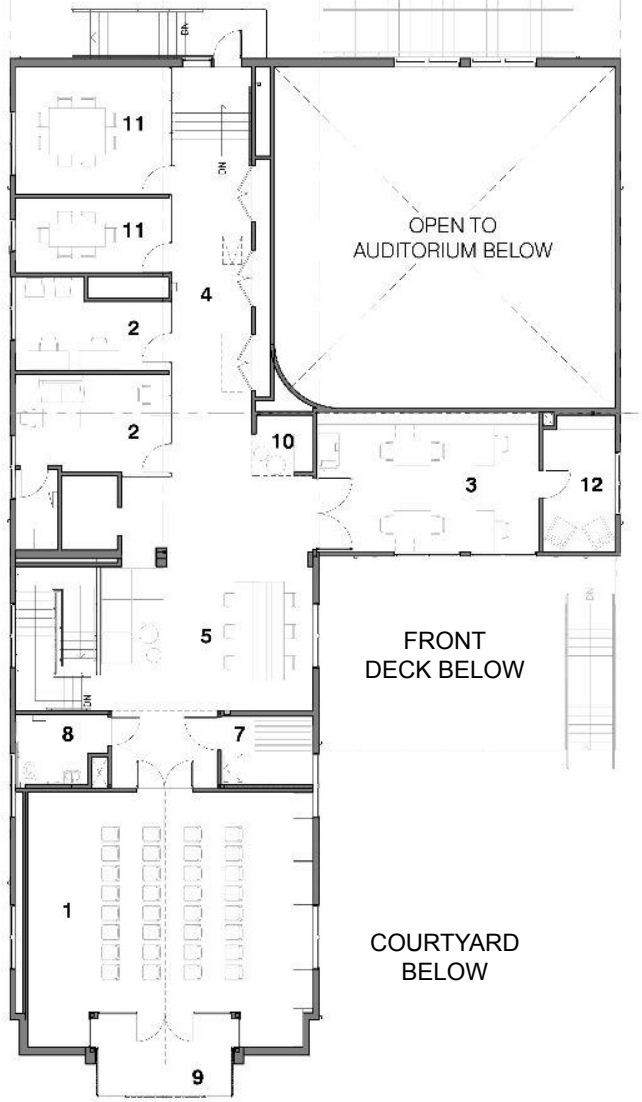

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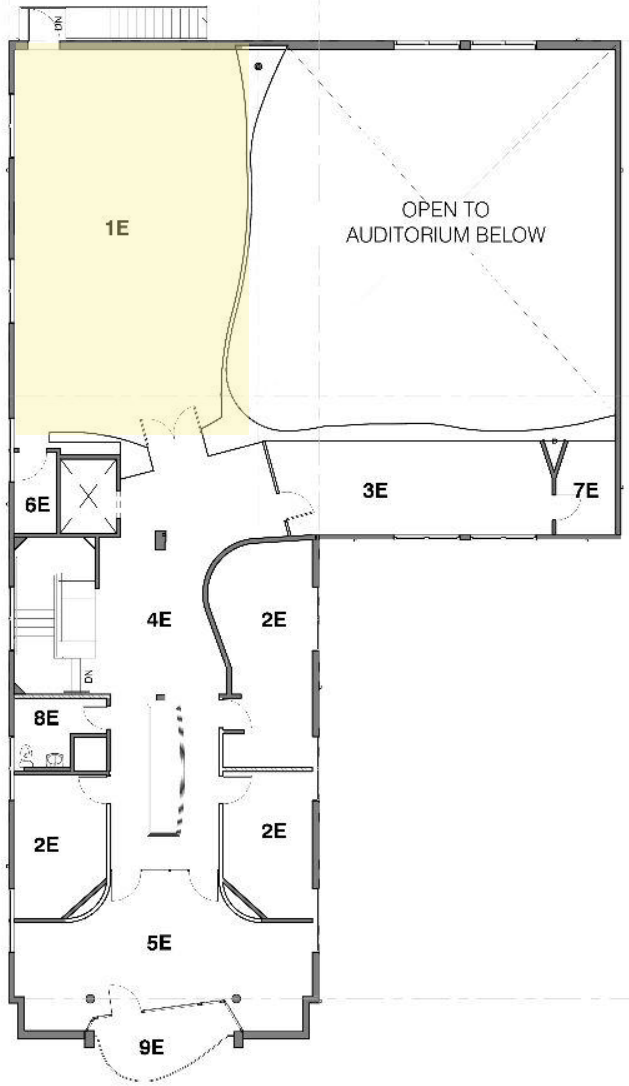
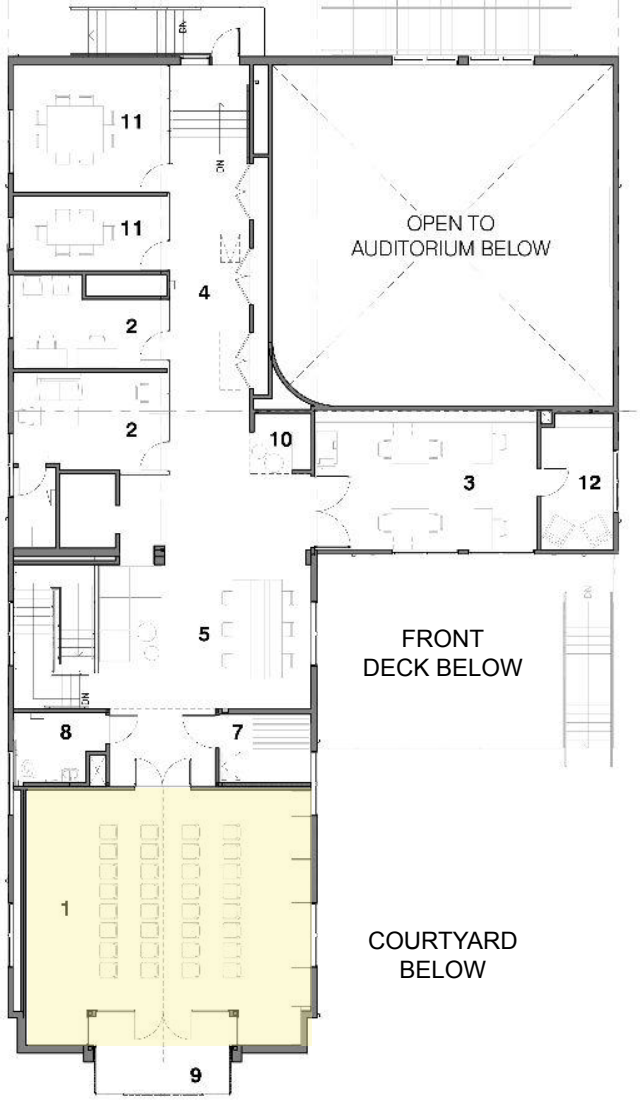


After



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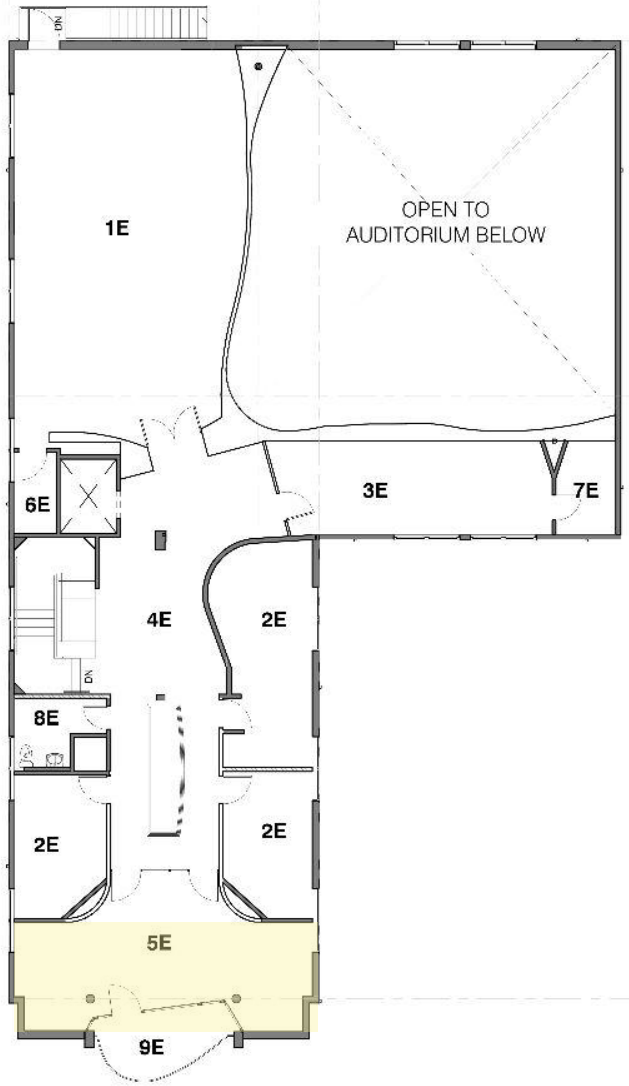

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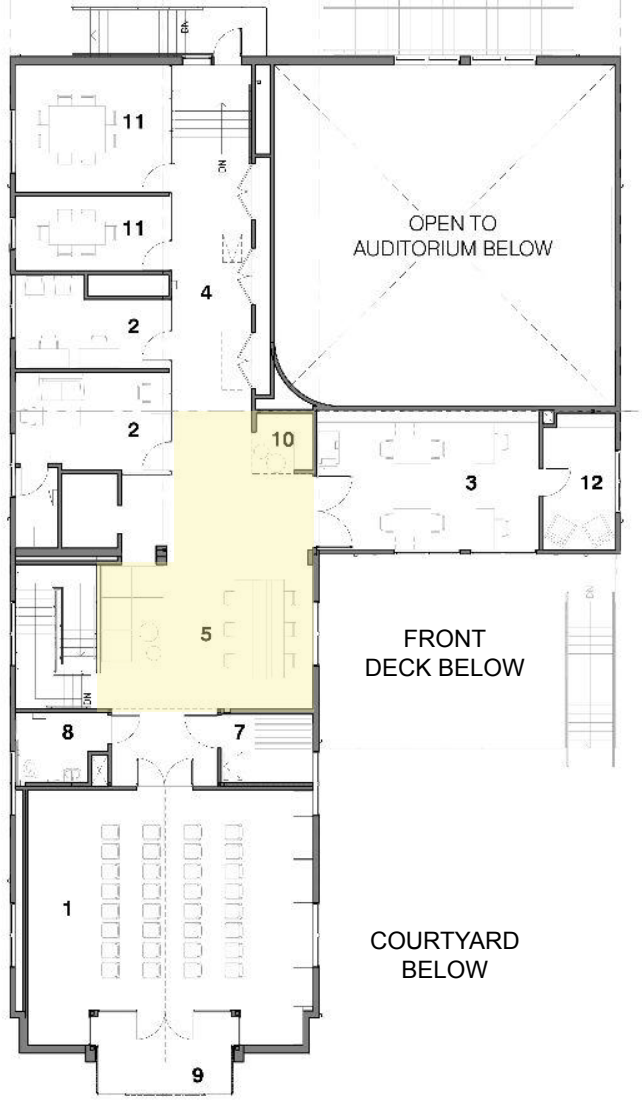


Safety and Connection

Comfort

Flexibility

Process

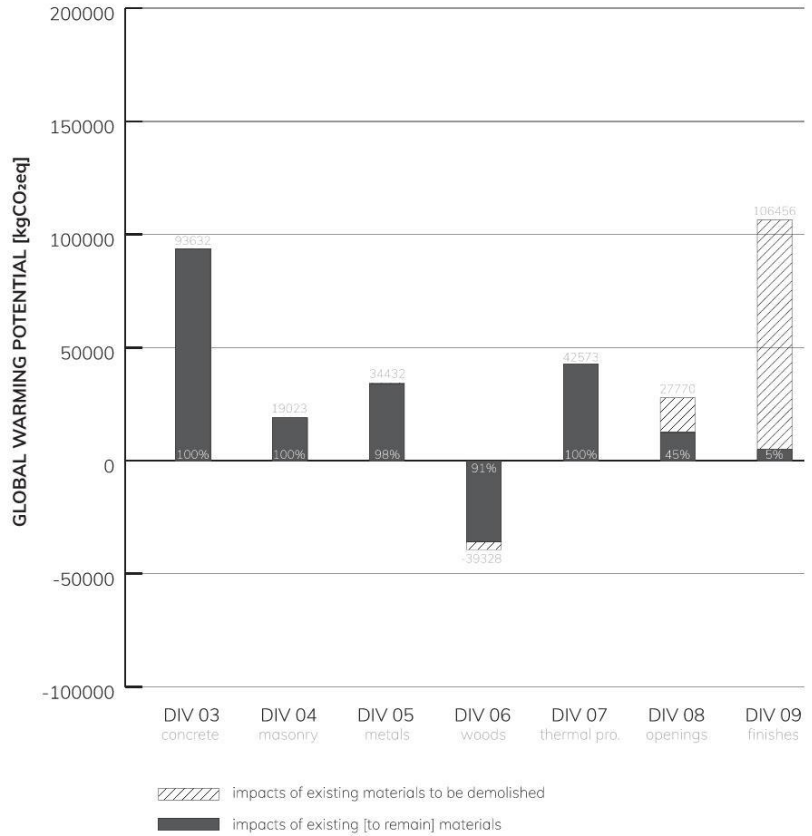
- Berkeley Hillel is a non-profit and had limited funding for the renovation project.
- Engaged building science consultant.
- We did not conduct energy modeling during design, but we did conduct Life Cycle Assessment after construction completion.
- Early contractor evaluations of the existing building.

Upgrade

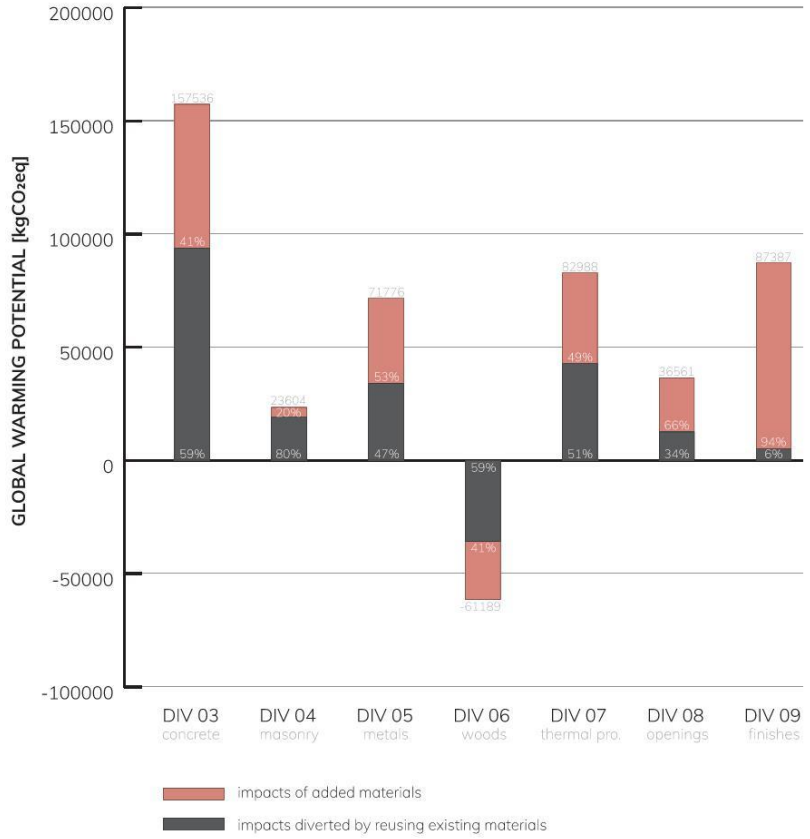
- Renewable energy was not included in the scope of the project
- Structure: mostly remained as-is
- Envelope: added insulation, replaced about half of the windows, added air sealing
- MEP systems: replaced in kind with higher efficiency systems
- EUI was improved from a baseline of 42.7 kBtu/sf-yr to 35 kBtu/sf-yr, representing an **18% reduction**.

Tally Analysis

Pre-renovation Embodied Carbon Impacts

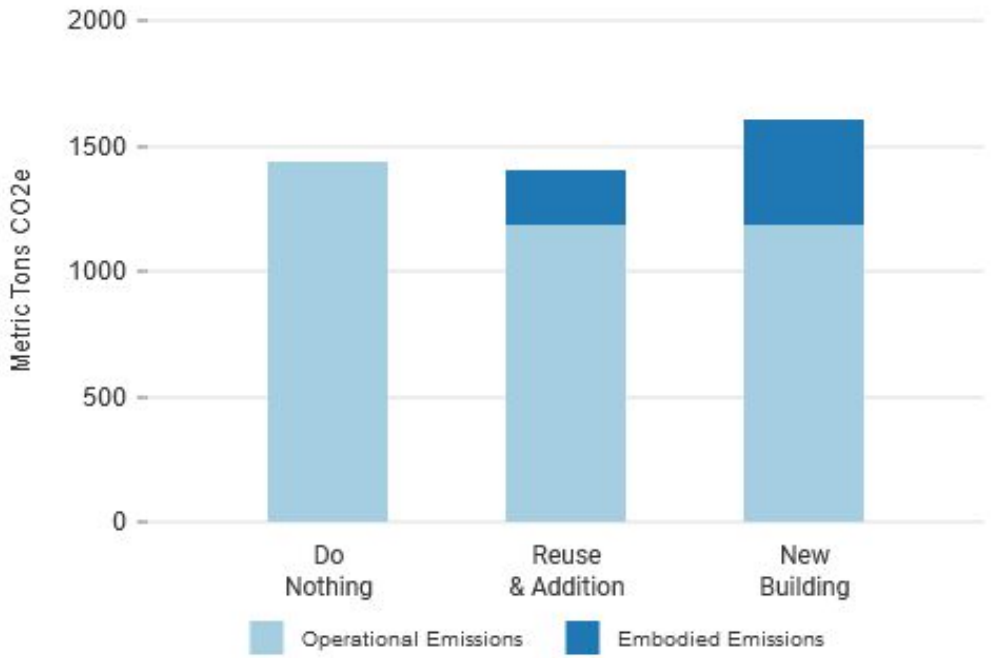


Post-renovation Embodied Carbon Impacts



CARE Tool Results

Total Added Embodied & Operational Emissions
Over 25 Years



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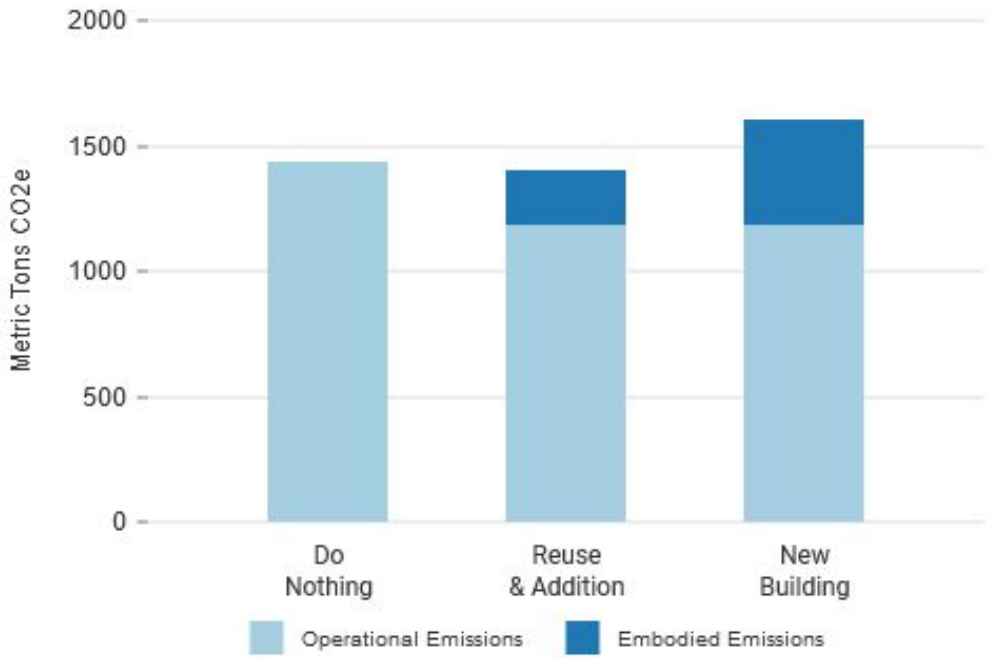
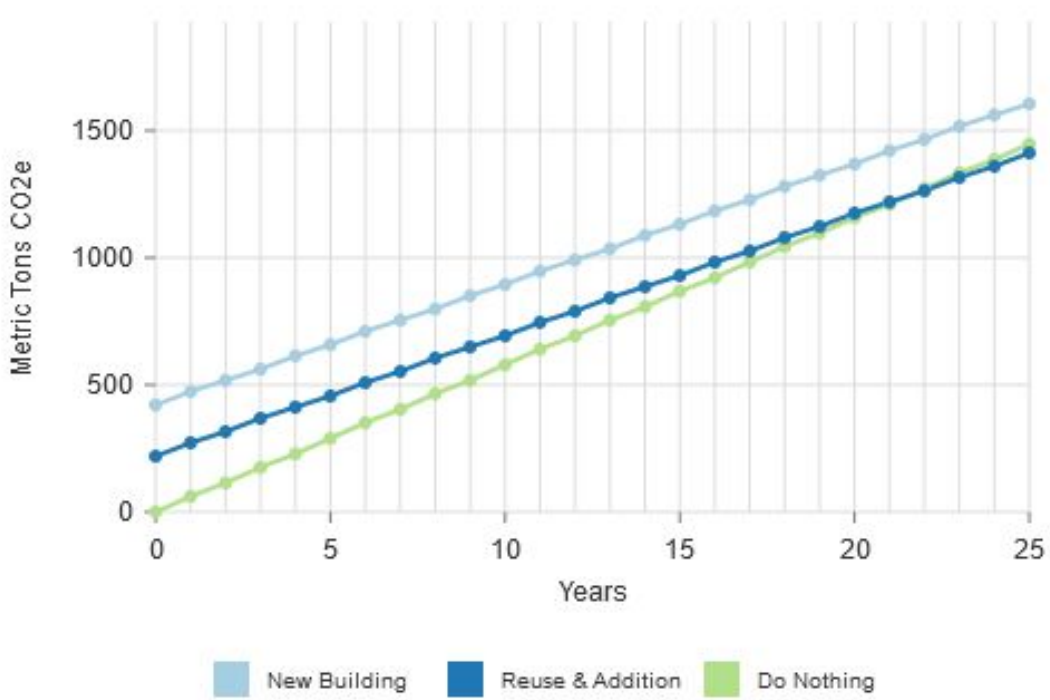


Cumulative Emissions Over Time



Lessons Learned

1. Consider total carbon.

Embodied carbon and operational carbon are critical..
Electrification is a huge opportunity in California!

Lessons Learned

1. Consider total carbon.

Embodied carbon and operational carbon are critical..
Electrification is a huge opportunity in California.

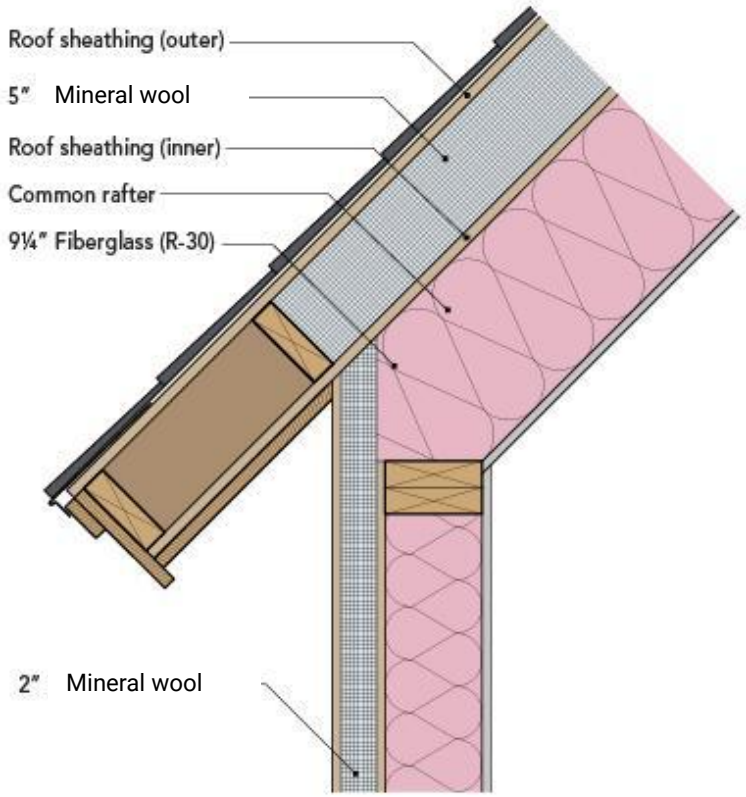
2. Tie sustainable features to the client’s interests.

Ensuring that sustainable design features survive to the end of the project requires careful thought and research.

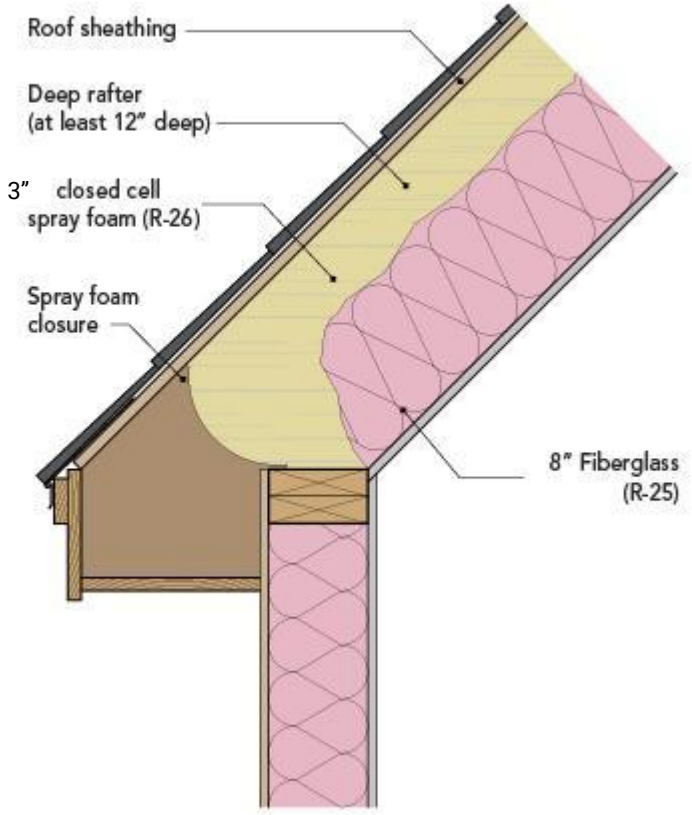
3. Reduce Concrete and Cement.

4. All foam is not created equal.

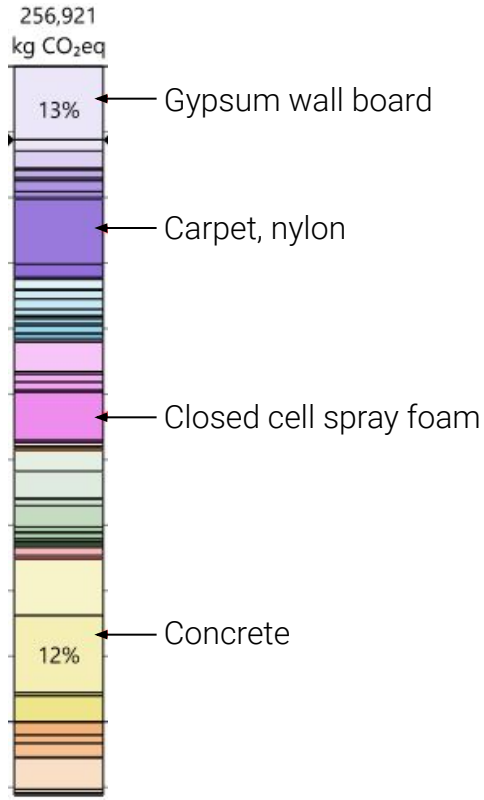
Target assembly



Actual assembly



Actual emission profile

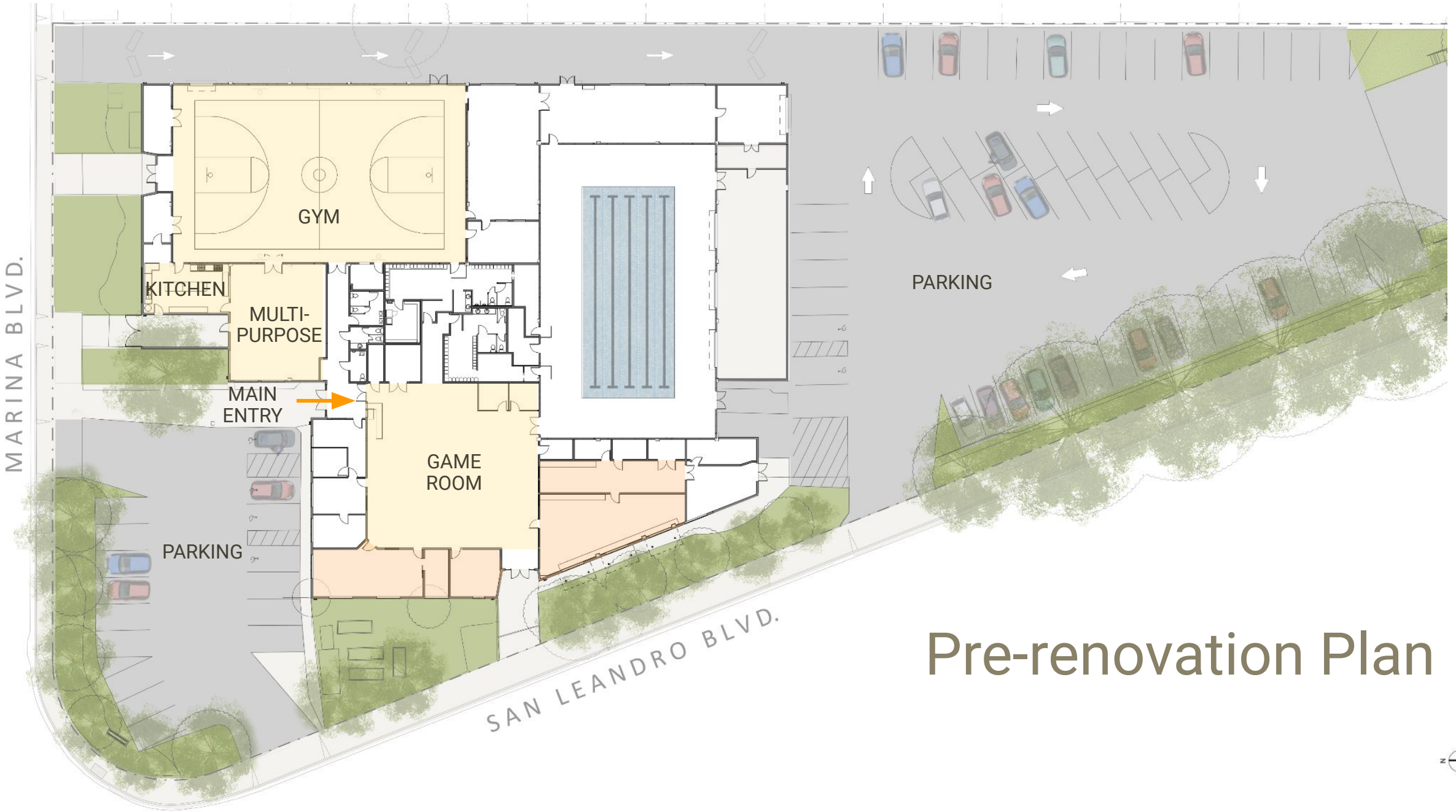


Source: https://www.finehomebuilding.com/project-guides/insulation/five-cathedral-ceilings-that-work

Transformed

Boys & Girls Clubs of San Leandro

- BGCSL serves San Leandro and San Lorenzo youth at 12 locations, partnering with school districts.
- Transformation of a 50 year old building into a contemporary teen center.
- Emphasis on three main pillars: academic success, healthy lifestyles, and character development.



Pre-renovation Plan

Renovation Plan


GYM
PROGRAM SPACES
POOL

Community

- Engagement with teens, staff, and others to understand what was desired in a renovated building.
- Benefit the community with a renovated space:
  - Expanded program offerings to serve more of the community
  - Provide a safe space for youth
  - Provide young people with spaces that foster a healthy lifestyle, academic success, and character development
  - Attract today's youth with a contemporary space where teens want to be
  - Better utilize all spaces


Great Room
GREAT FUTURES START HERE.
BOYS & GIRLS CLUBS
OF SAN LEANDRO
2:48pm
Teen Tech
Center

Daylight & Transparency

Flexibility & Connectedness

Contemporary & Relevant

Usable Outdoor Space

Process

- Once in a generation opportunity for Boys and Girls Club to transform their building.
- Collaboration between design team, owner, and contractor.
- Funding timeline drove the schedule.

Upgrades

- Pre-renovation: 28,580 sf total; **21,867 sf w/o pool**
- Post-renovation: 28,975 sf; **22,262 sf w/o pool**
- Envelope improvements: new windows, skylights, and wall/roof insulation
- Improved daylighting
- Electric heat pump HVAC systems
- Gas remained in the kitchen, gym, and pool

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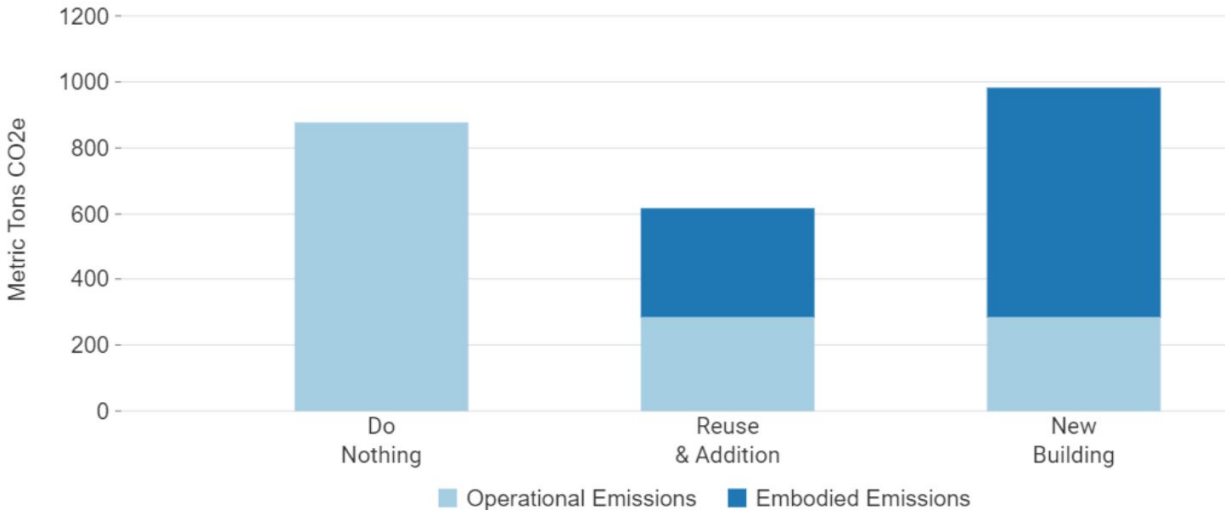
- Envelope improvements: new windows, skylights, and wall/roof insulation
- Improved daylighting
- Electric heat pump HVAC systems
- Gas remained in the kitchen, gym, and pool
- Energy Use Intensity **(EUI) was reduced by 38%** from 25.7 kBtu/sqft-yr to 16.0 kBtu/sqft-yr
- **PV system was installed to offset 100%** of electricity use for an energy offset of 12.1 kBtu/sqft-yr

CARE Tool Results

Total Added Embodied & Operational Emissions Over 25 Years



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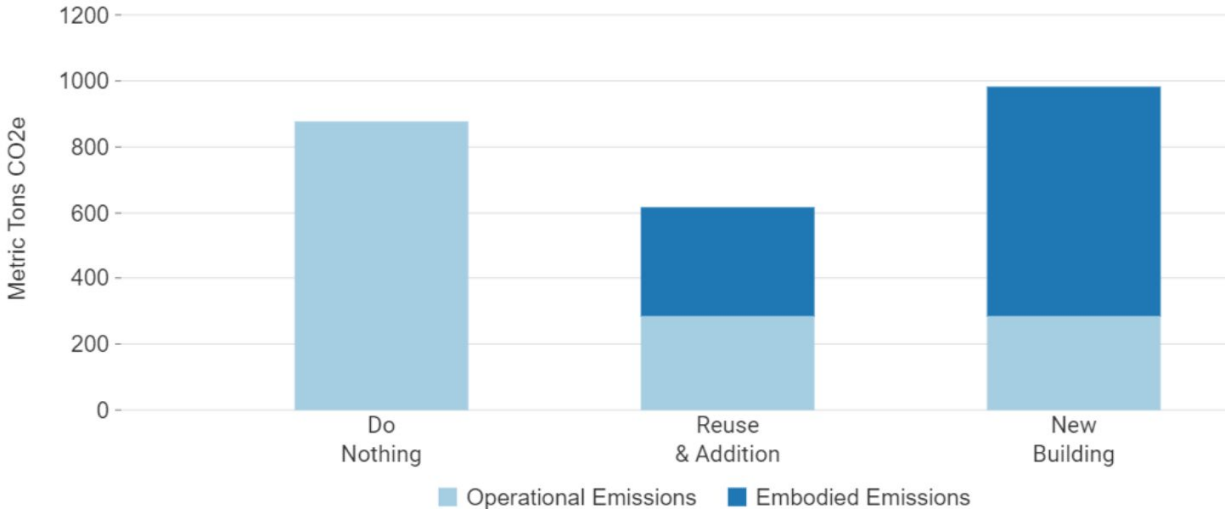
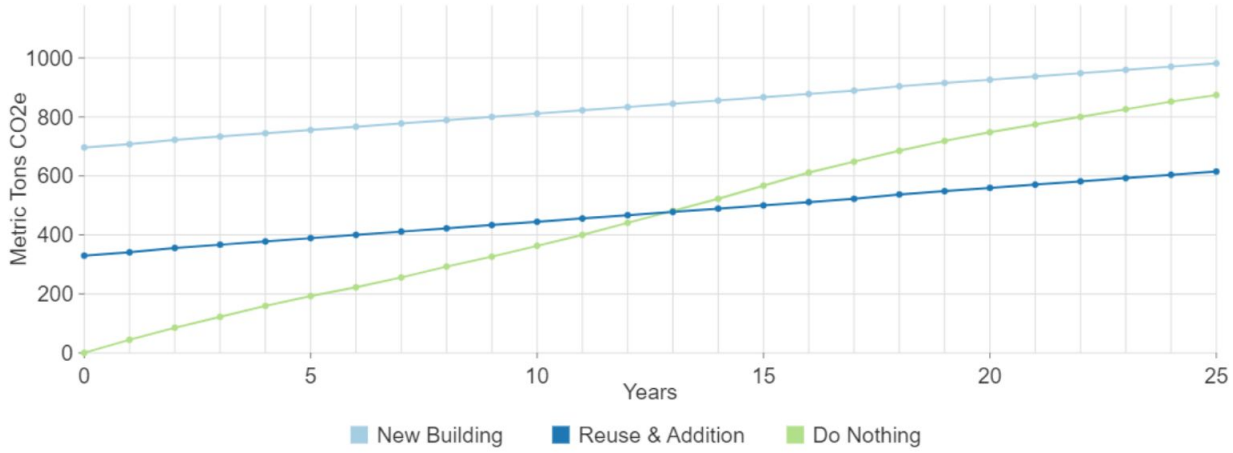


Cumulative Emissions Over 25 Years



Lessons Learned

1. Build modeling into architectural scope/schedule

Incorporate modeling into the design process and workflow

Lessons Learned

1. Build modeling into architectural scope/schedule

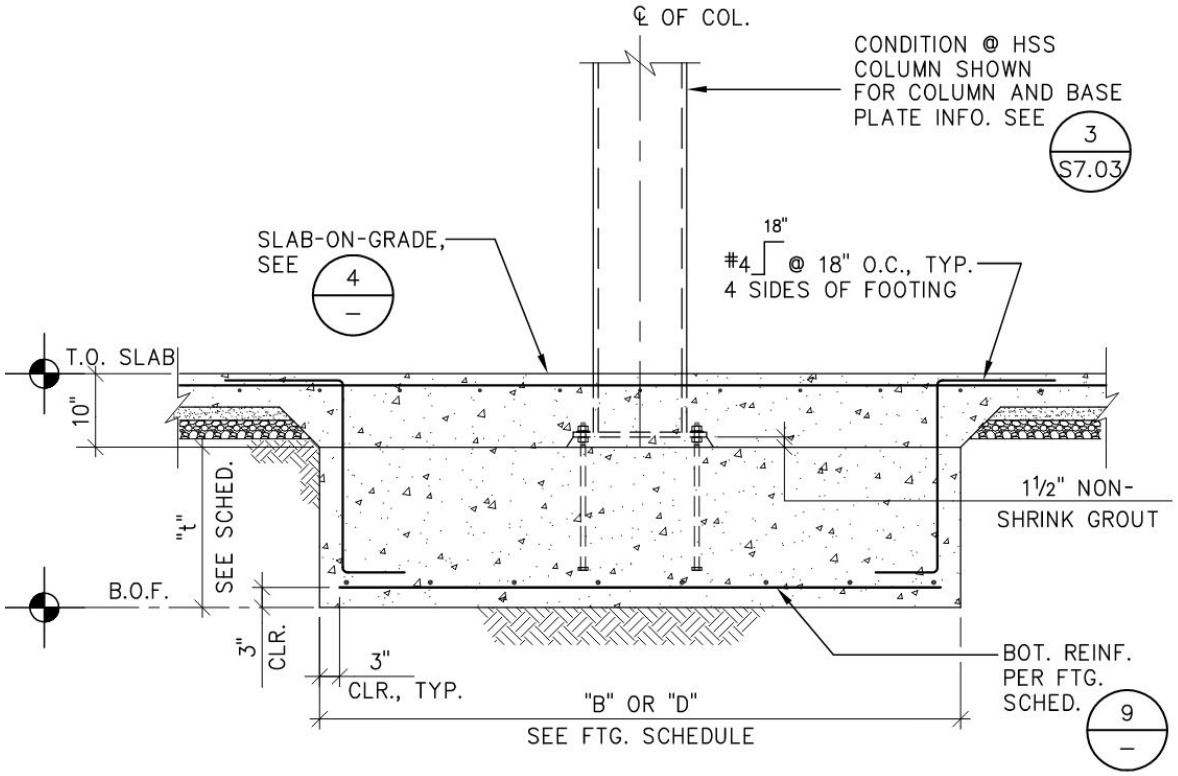
Incorporate modeling into the design process and workflow

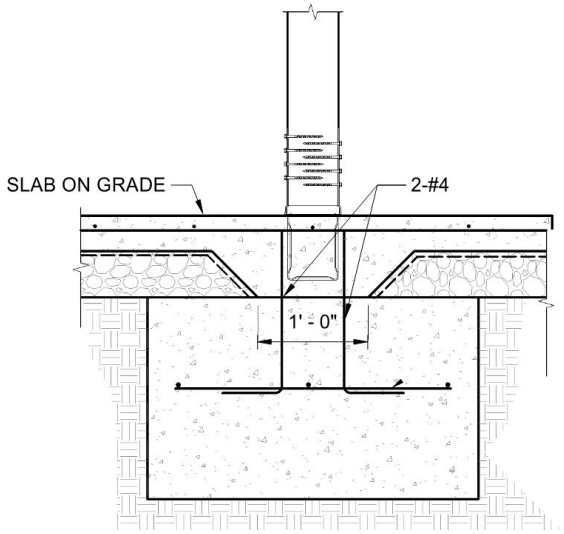
2. Be prepared with go-to embodied carbon metrics

When cost saving measures are proposed during design or CA, have metrics on hand to make the case

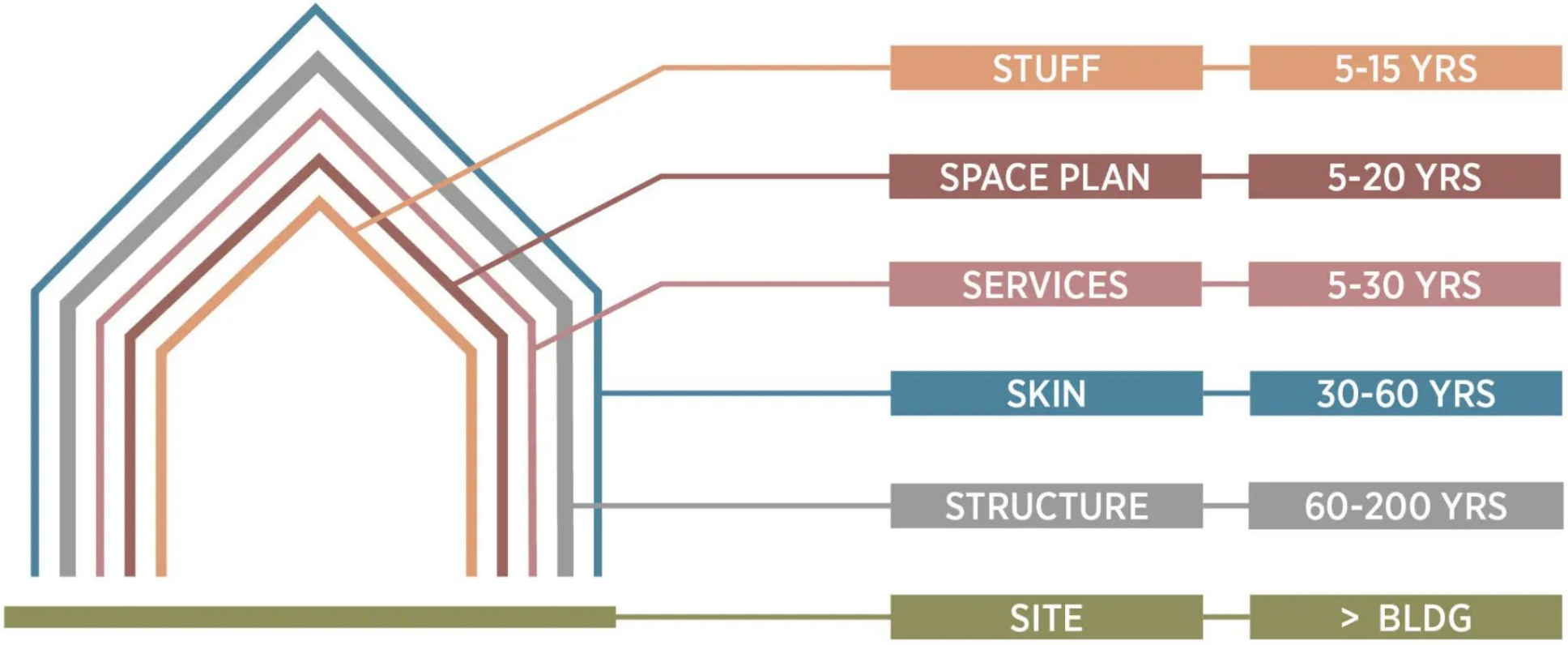
3. Initial Cost vs. Embodied Carbon

No geotech report led to oversized foundations





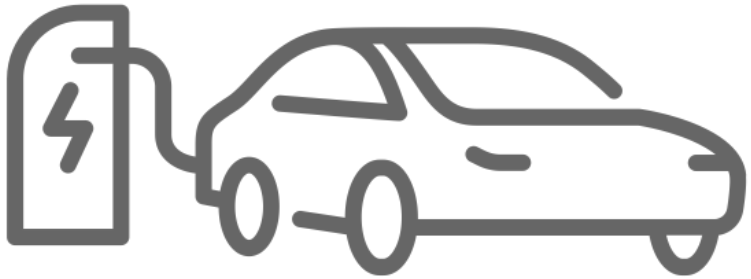
4. Prepare for the future.



Source: Stewart Brand's 6 S's from How Buildings Learn

Source: https://lmnarchitects.com/lmn-research/10-existing-building-reuse

4. Prepare for the Future



EV chargers = 40 Amps each

Teen Cafe = 200 Amps

Transformed

Oakland EcoBlock

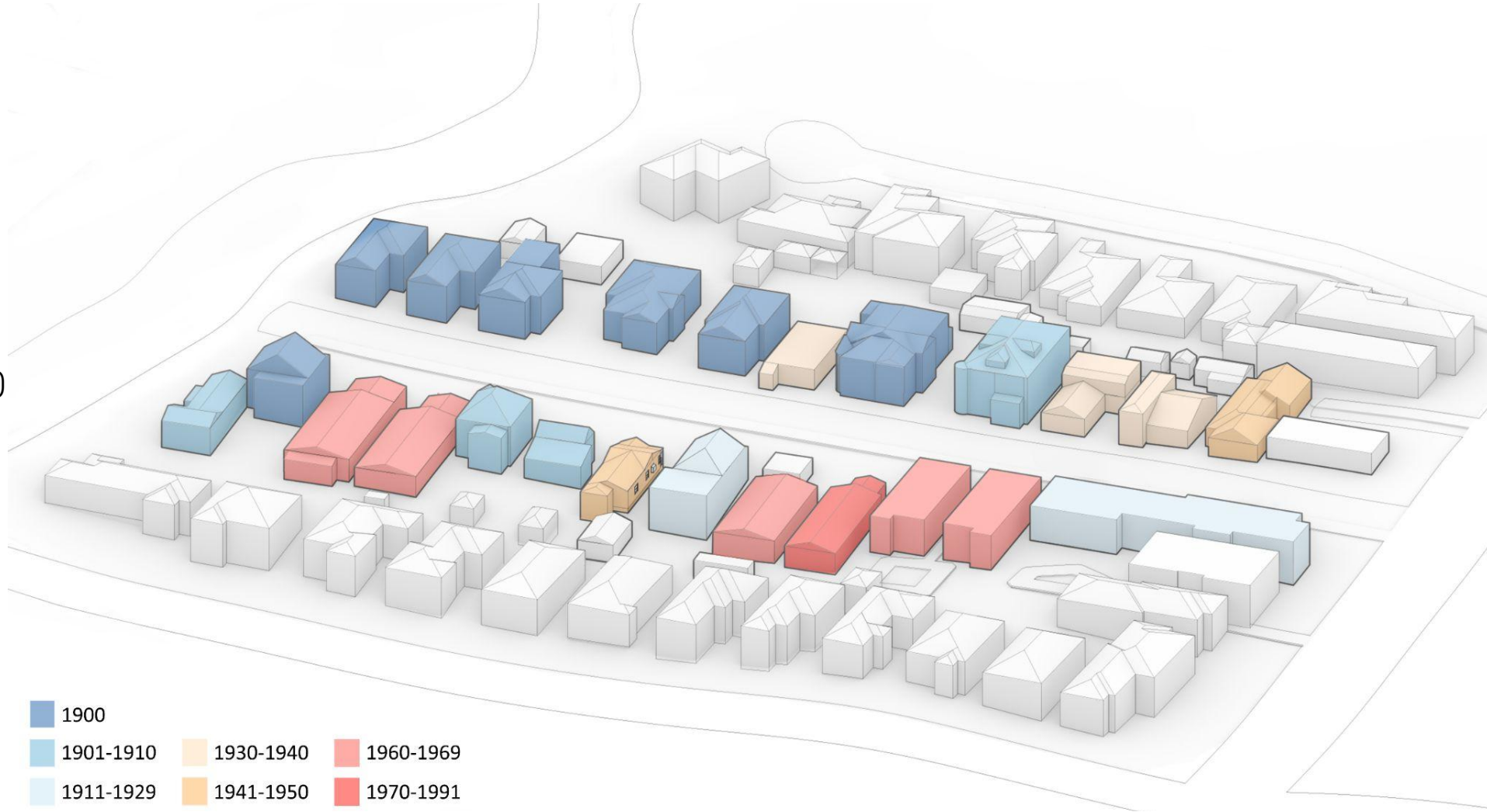
A grant-funded study to

- **Create an Advanced Energy Community Model** that equitably and radically reduces carbon emission in existing residential neighborhoods.
- **Undertake collaborative action** that builds community and improves community resilience.


9
EcoBlock
Projects
180
Individual
Projects

Residential Block Characteristics

- 24 properties
- 1 to dwelling units per lot
- Lot size: ~4000 sf
- Dwelling unit size: 850 - 1,600 sf
- 1-2 story wood-frame construction
- Built between 1890s & 1970s



Oakland EcoBlock Characteristics

- 18 participating properties with 24 participating dwellings
- Energy efficiency & electrification retrofits
- Shared rooftop PV and (if funded) shared Battery & Microgrid
- Shared EV & Curbside EV charger
- Legal & financial structure for shared ownership

Community

Neighborhood Goals

NEIGHBORHOOD GOALS

PROMOTE COMMUNITY

- **Increase** communication, collaboration and fun
- **Share** skills, knowledge and resources
- **Improve** shared spaces through organized community action

Neighborhood Goals + Grant Goals

NEIGHBORHOOD GOALS

PROMOTE COMMUNITY

- **Increase** communication, collaboration and fun
- **Share** skills, knowledge and resources
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GRANT GOALS

EQUITABLY DECARBONIZE

- **Create an Advanced Energy Community Model** for equitable decarbonization an existing underserved residential block
- **Strengthen community**
- **Increase neighborhood resilience**

= Neighborhood Benefit

NEIGHBORHOOD GOALS

PROMOTE COMMUNITY

- **Increase communication,** collaboration and fun
- **Share** skills, knowledge and resources
- **Improve** shared spaces through organized community action

NEIGHBORHOOD BENEFIT

COMMUNITY DECARBONIZATION

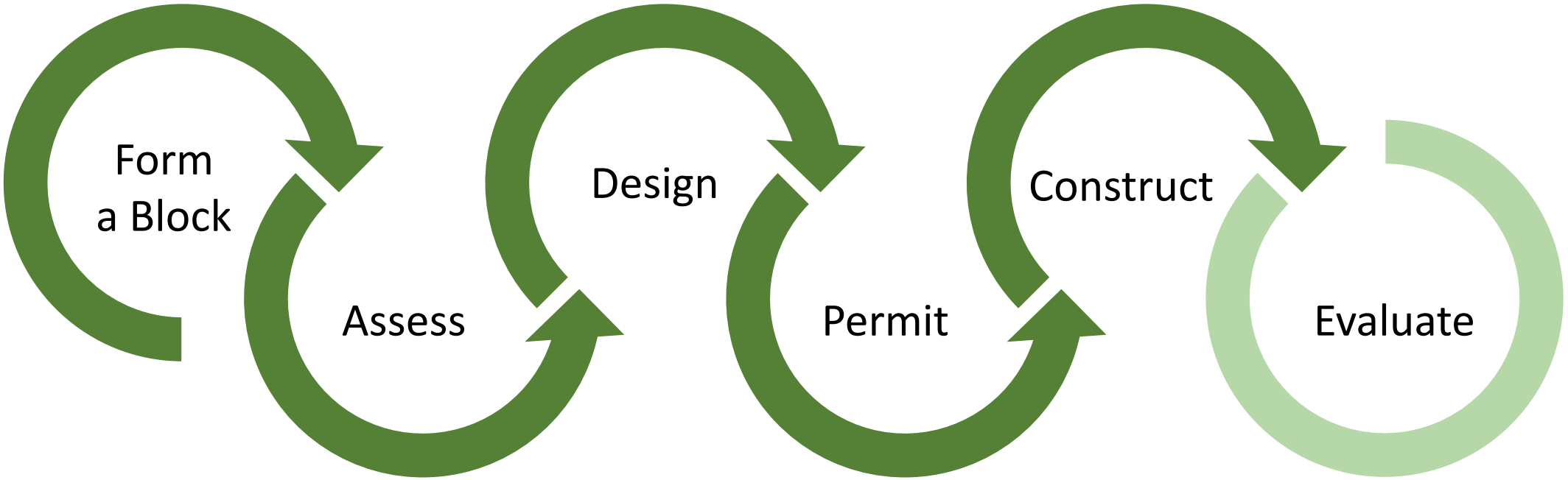
- **Neighborhood participation** in block-wide carbon reduction initiatives
- **Home upgrades**
- **Shared ownership** of clean energy-related assets

GRANT GOALS

EQUITABLY DECARBONIZE

- **Create an Advanced Energy Community Model** for equitable decarbonization an existing underserved residential block
- **Strengthen community**
- **Increase neighborhood resilience**

Process - Project Team



Process - Community

- Dedicated community engagement liaison
- In-person & Zoom meetings where neighbors outnumbered team members
- Understandable terminology and graphics
- Language interpretation
- Hands on events

Process - Knowledge Sharing

ecoblock™

FEBRUARY 2023 I ISSUE NO. 26

AROUND THE BLOCK

ECOBLOCK'S COMMUNITY NEWSLETTER

From the team

Dear Neighbors,

Happy New Year! We hope you had a wonderful start to 2023 with your loved ones (while staying safe and dry amidst the rain). As we prepare for construction, we are energized by the progress our team has made over the past twelve months—and this wouldn't have happened without you, the residents, who have dedicated your time and effort to this ambitious endeavor.

Here's the latest in this issue of *Around the Block*:

- What has **EcoBlock achieved in 2022**, and what are **our plans for 2023**? (pg. 2-3, 6)
- What is **solar energy**, and how does it work? (pg. 4-5)
- Decked out with high-end retail stores and restaurants, **Temescal** is one of the trendiest neighborhoods in Oakland—as well as the site of skyrocketing housing prices and gentrification. How did this neighborhood come to be? (pg. 7)

With appreciation,

Therese Peffer
Principal Investigator
tpeffer@berkeley.edu

Cathy Leonard
*Community Liaison**
cleonardecoblock@gmail.com
**Primary contact*

CREDIT: HAIXIN GUO

Gearing up for construction: The team expects to break ground in 2023.

General announcements

All residents: Homeowners & Renters

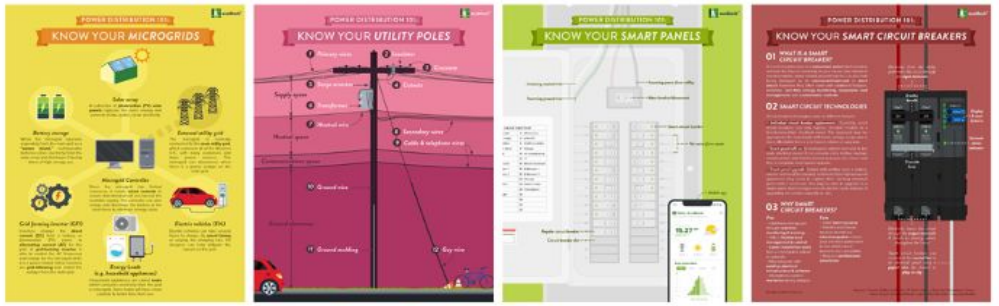
- The Water team is updating permit drawings for the **end-of-block stormwater bioretention design**; the City of Oakland is reviewing drawings for the **EcoBlock Energy Shack**, which will house the central microgrid battery if funded; and the Energy team will be submitting the **Net Energy Metering (NEM) 2.0 applications** to lock you into better rates for the rooftop solar panels.
- We plan to hold an **in-person block meeting in March** to get your feedback and share more details on the project. More to come!
- The research team recently **won a U.S. Environmental Protection Agency (EPA) grant** to fund the end-of-block stormwater bioretention design (to slow and filter rainwater) and street plantings!
- We are working to install a **dual-port, curbside EV charger** that will be owned by the EcoBlock Community Association. This process can take 4-6 months.

All Homeowners

- The Design/Construction team is aiming to finalize the **scope of work for each participating household** this month. We plan to hold meetings with each homeowner to discuss details and answer questions.
- The Business/Finance team is working to obtain **Directors and Officers (D&O) insurance** for the BSA Board of Directors.
- We will be scheduling a **meeting with all participating homeowners** soon to discuss the project schedule and scope of work. Stay tuned!

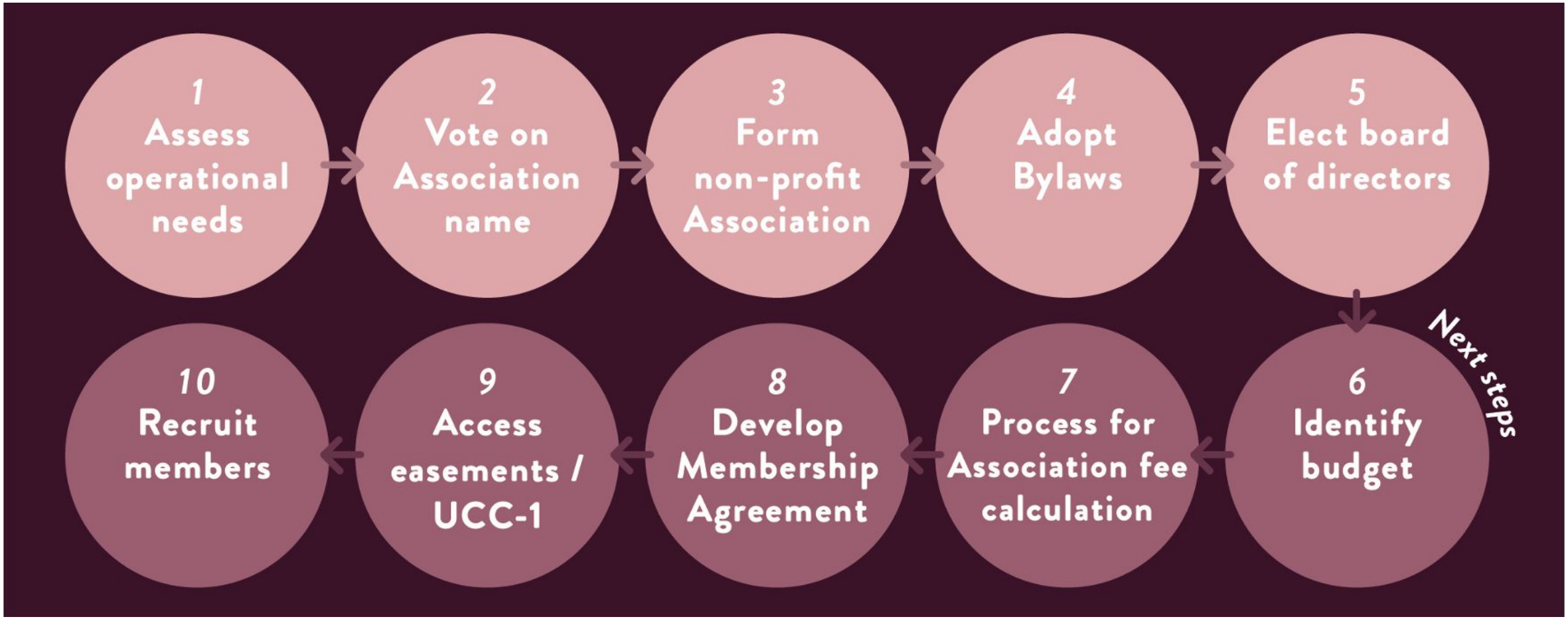
Appliances 101

Power Distribution 101

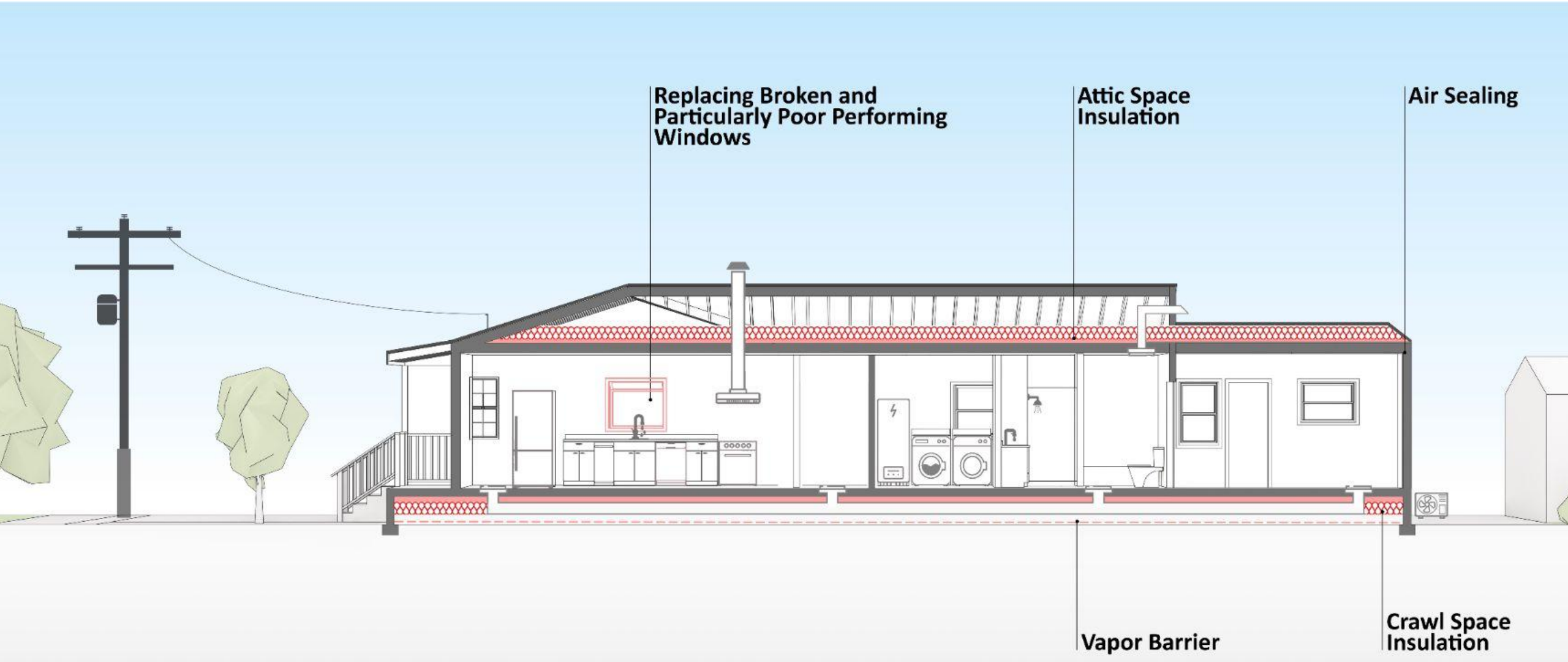


Retrofits 101

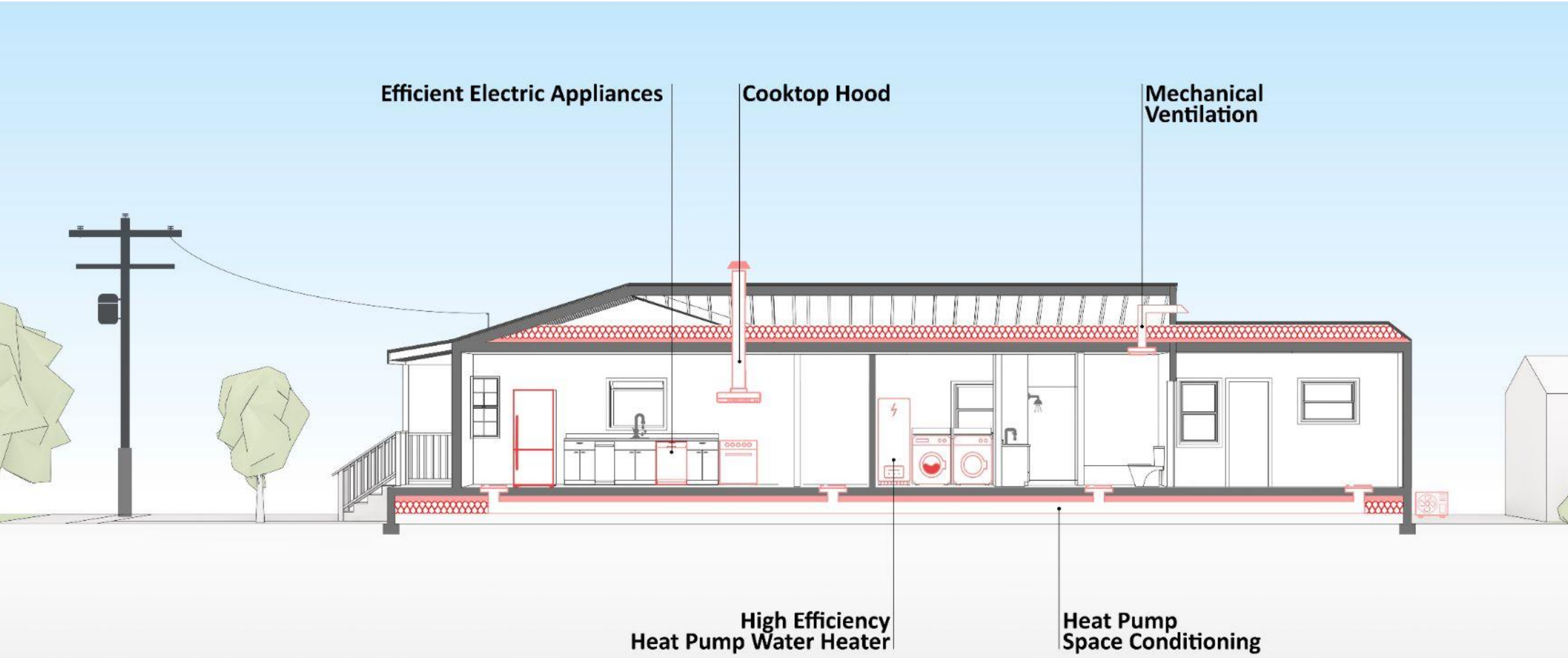
Process - Forming an HOA



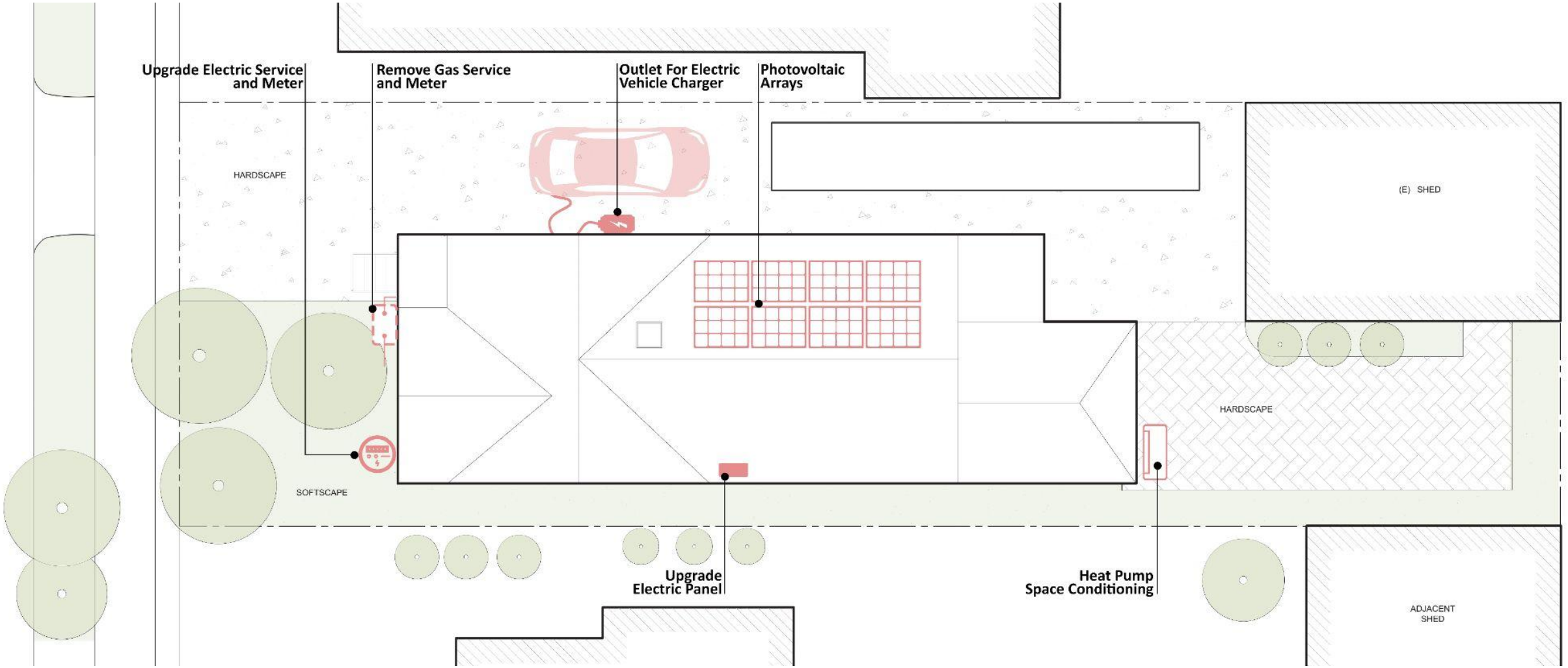
Upgrades - Building Envelope



Upgrades - Mechanical & Electrical



Upgrades - Exterior

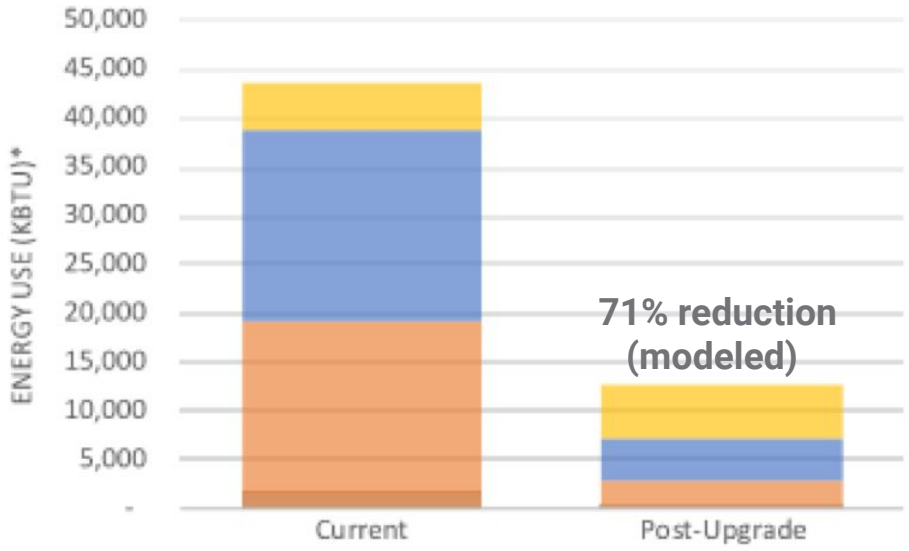


Upgrades - Impact

	EXISTING BUILDINGS (ACTUAL)	REUSED BUILDINGS (MODELED)
NET FLOOR AREA	19,409 sf in 18 buildings/24 units	19,409 sf in 18 buildings/24 units
ENERGY USE INTENSITY	22 kBtu/sqft-yr	11 kBtu/sqft-yr
% RENEWABLE ELEC	0%	100%

Upgrades - Annual Energy Use

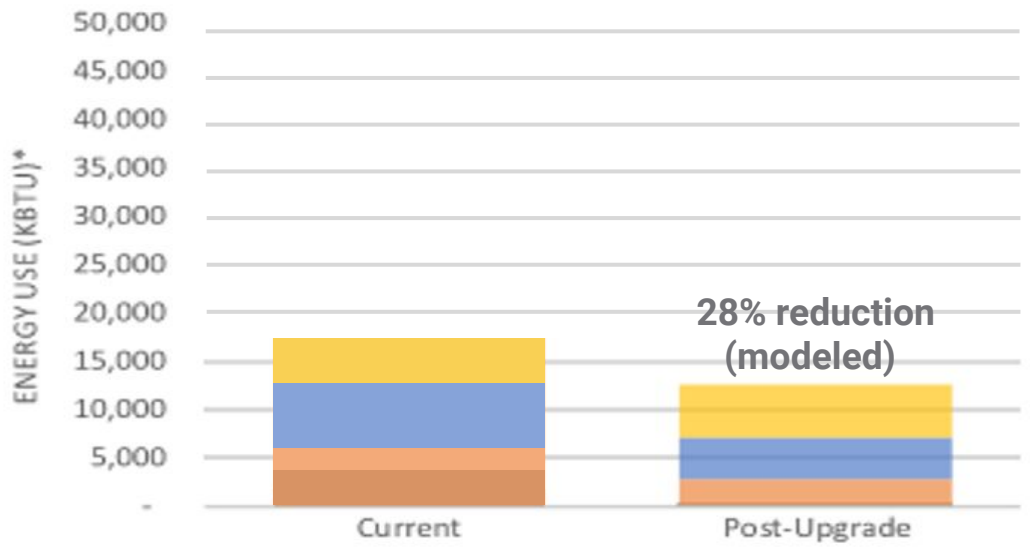
Poorly performing existing building



	Current	Post-Upgrade
Lighting and appliances	4,757	5,549
Water heating	19,809	4,071
Space heat	17,391	2,893
Supplemental electric space heaters	1,695	
Air conditioning	-	89

Combined gas and electricity

Well performing existing building



	Current	Post-Upgrade
Lighting and appliances	5,160	5,951
Water heating	6,503	4,813
Space heat	3,296	2,332
Supplemental electric space heaters	3,439	
Air conditioning	-	114

Combined gas and electricity

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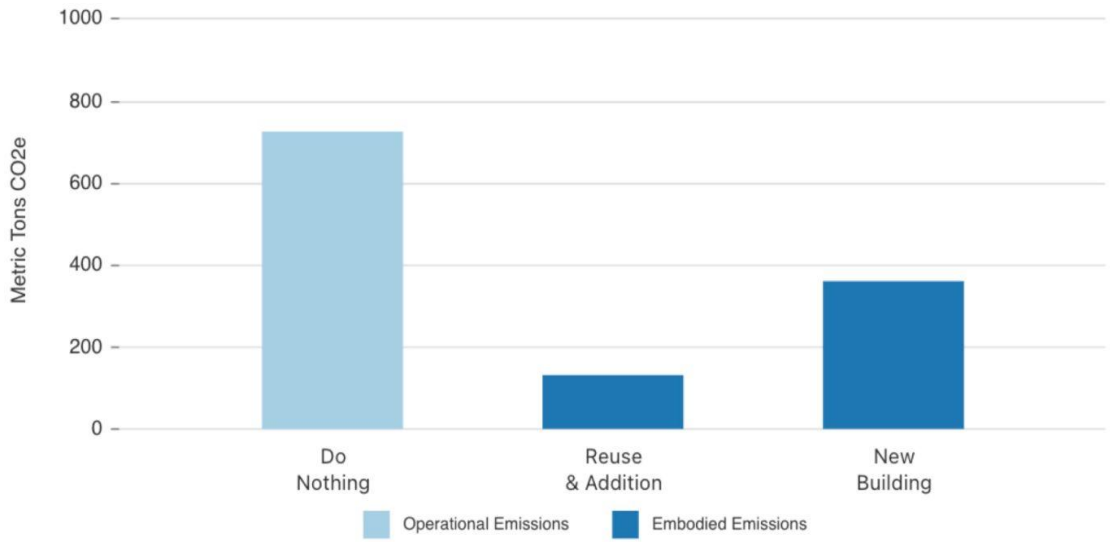

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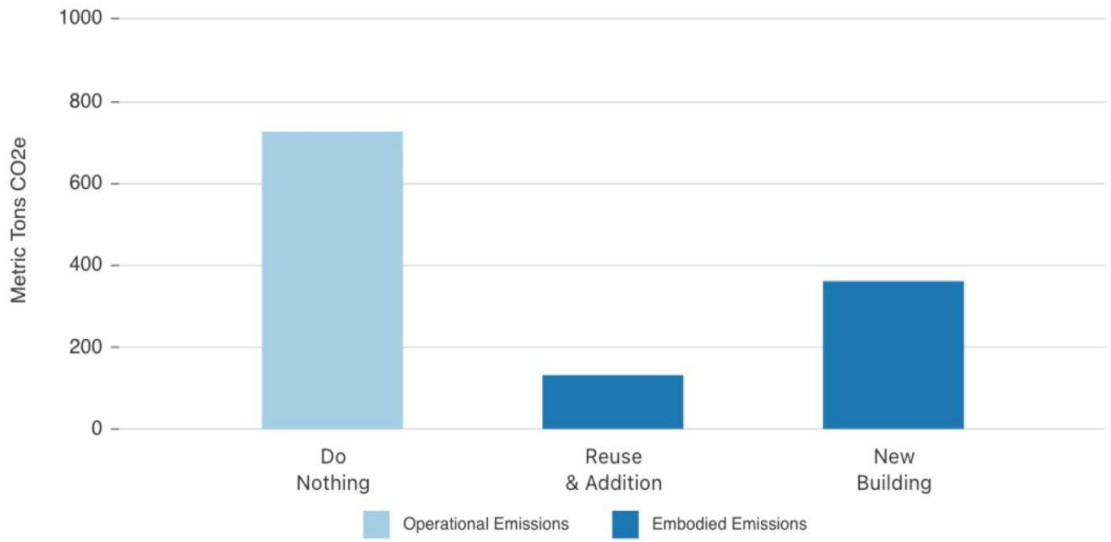

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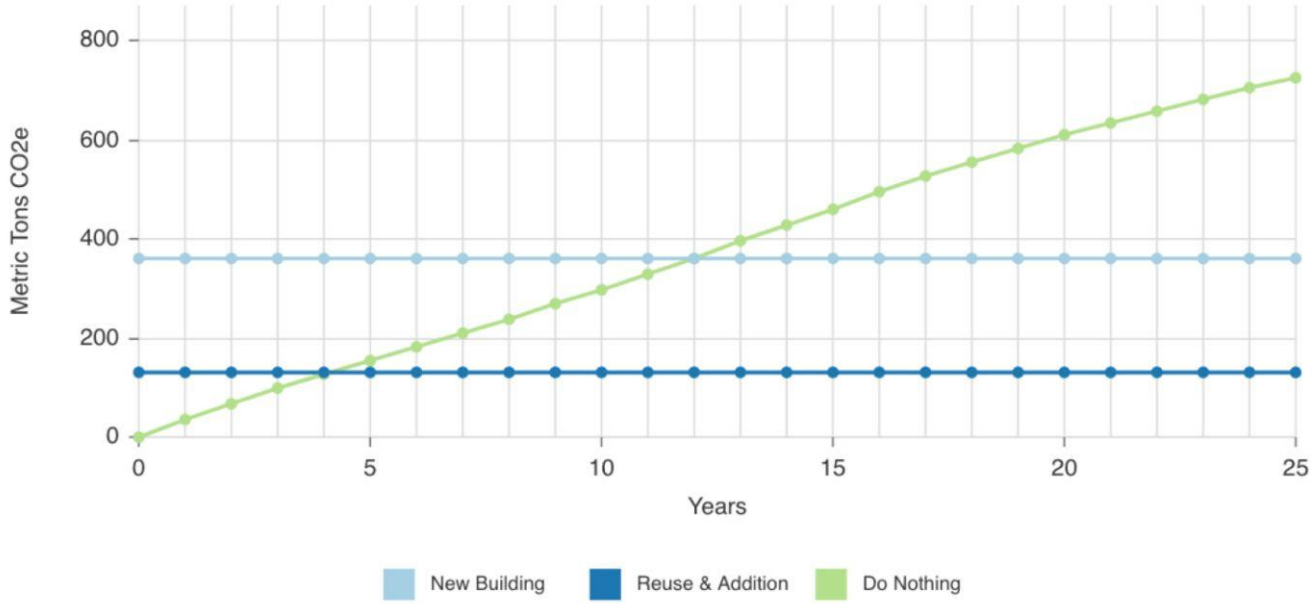
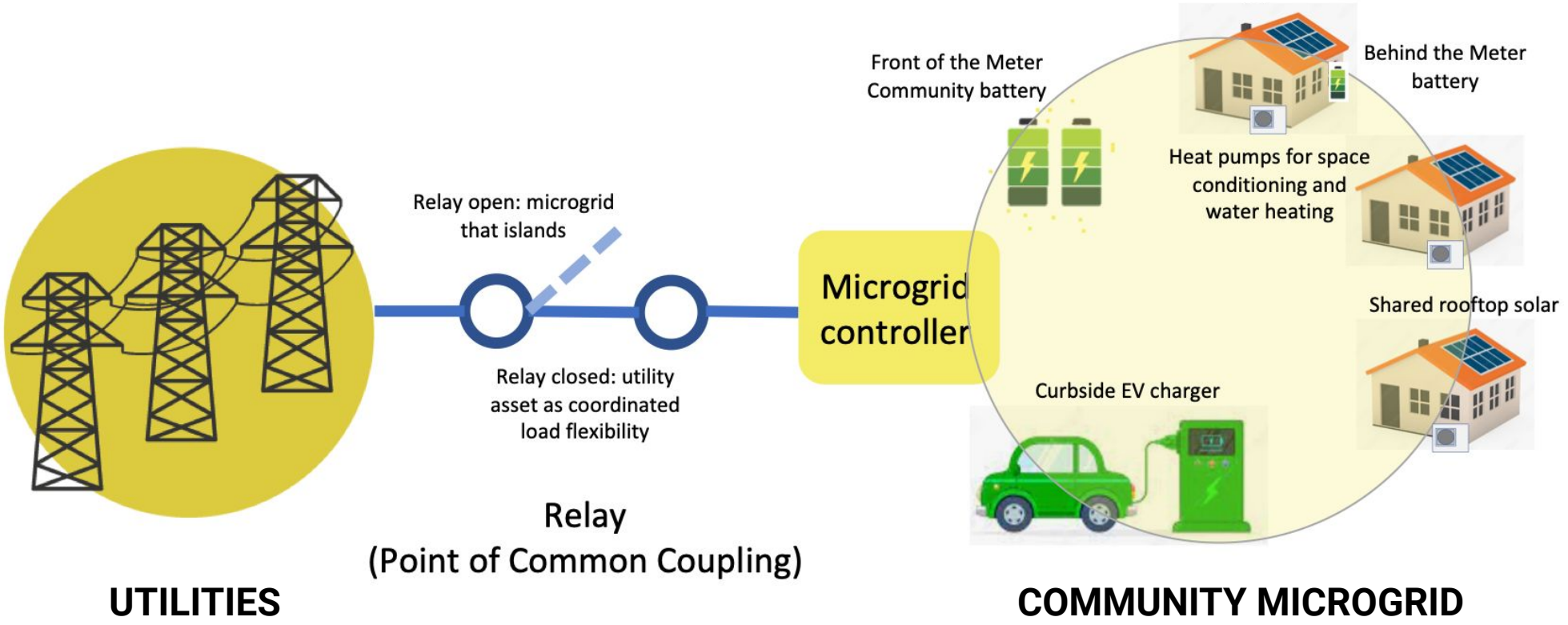


Lessons Learned

1. Utilities and Authorities Having Jurisdiction (AHJ) need retooling to support existing multi-property electrification efforts.



Lessons Learned

2. Do what’s doable now.

Space conditioning

Appliances
ALL ELECTRIC HIGH EFFICIENCY

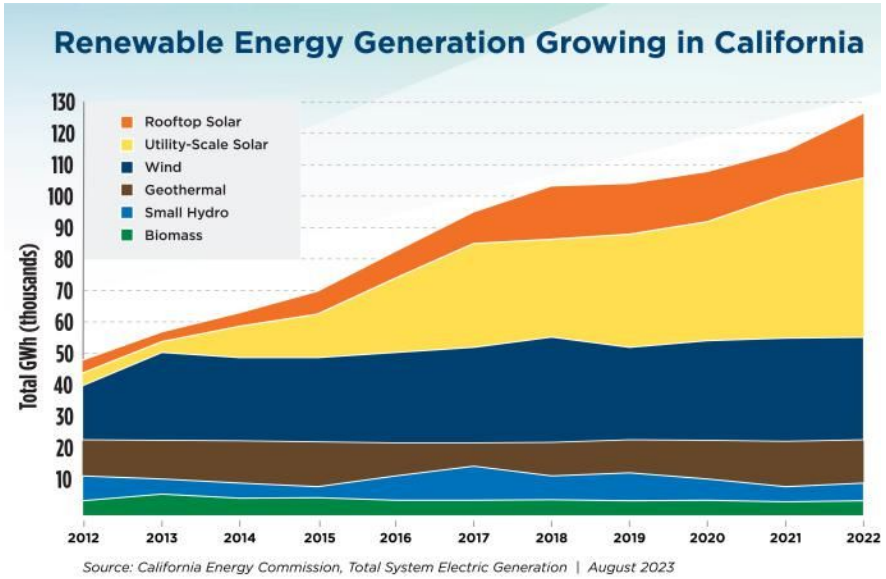
Water Heating

Lessons Learned

3. The EcoBlock Model empowers people.

Lessons Learned

4. The architectural community plays an important role in reducing carbon emissions.



Key Takeaways

1. Transform the Buildings we Reuse
2. All Emissions Matter
3. Engage and Empower Community
4. Do What’s Doable

We can’t save this

Without saving this

Thank you.

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Laura Levenberg
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