County of San Diego

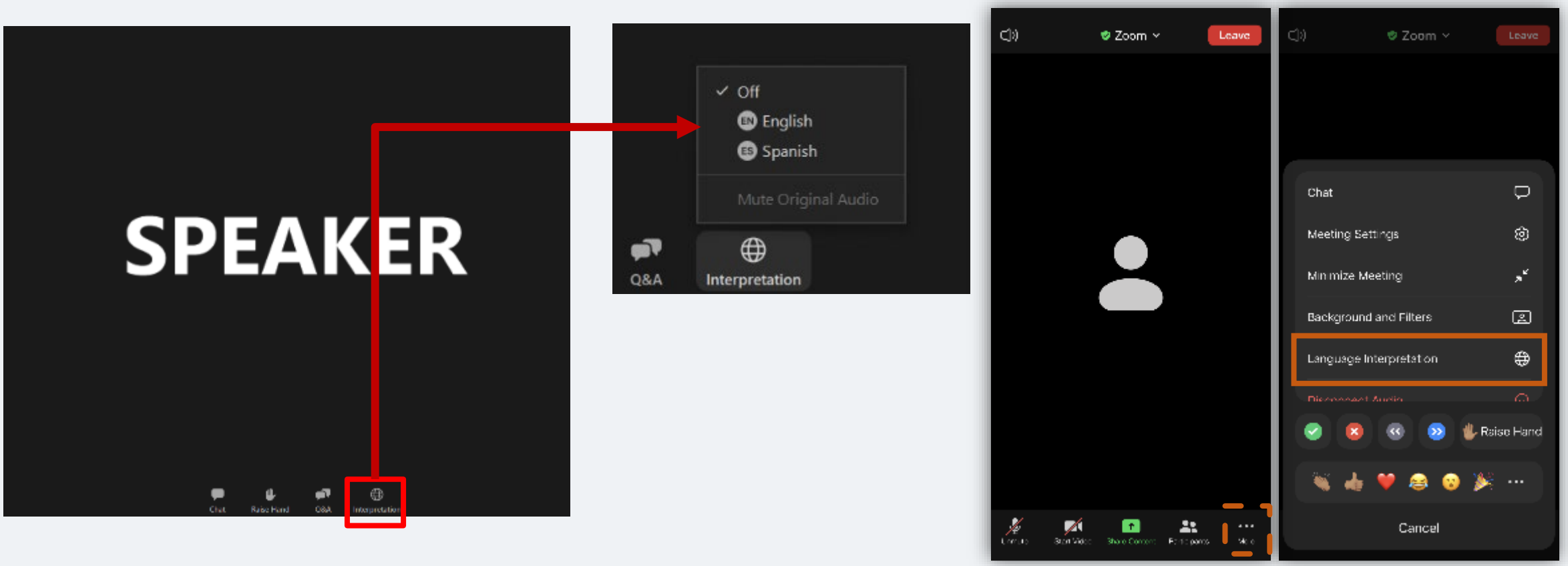
GETTING TO ZERO

SAN DIEGO COUNTY
REGIONAL DECARBONIZATION FRAMEWORK

Buildings Working Group

November 1, 2022

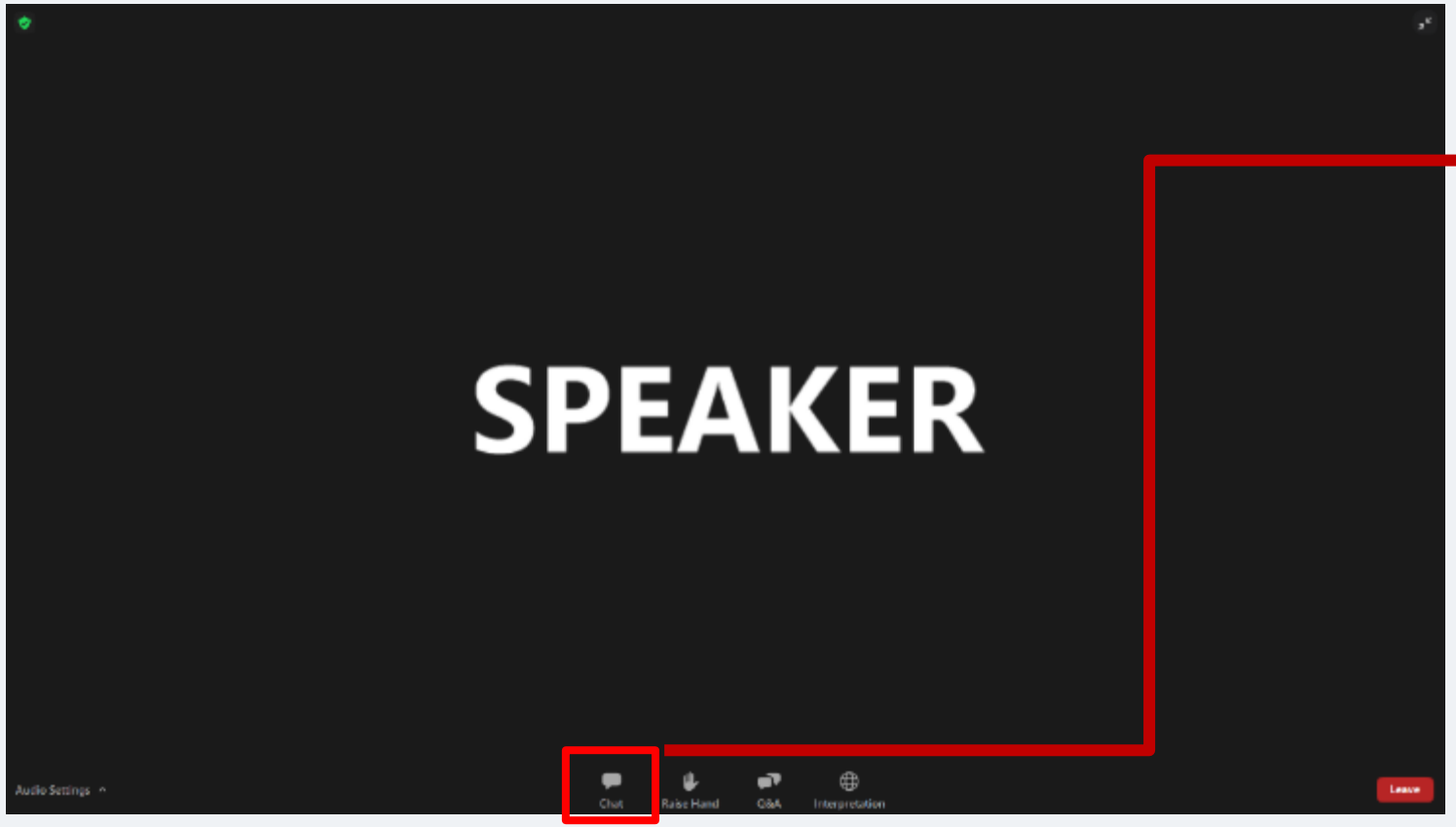
How to use Zoom // *Cómo Usar Zoom*

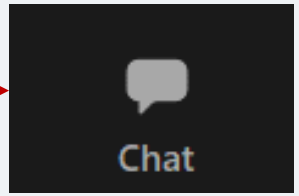


Please select your language of choice (you must select one option)

Debe seleccionar el idioma de su preferencia (Tiene que escoger un idioma)

How to use Zoom // *Cómo Usar Zoom*

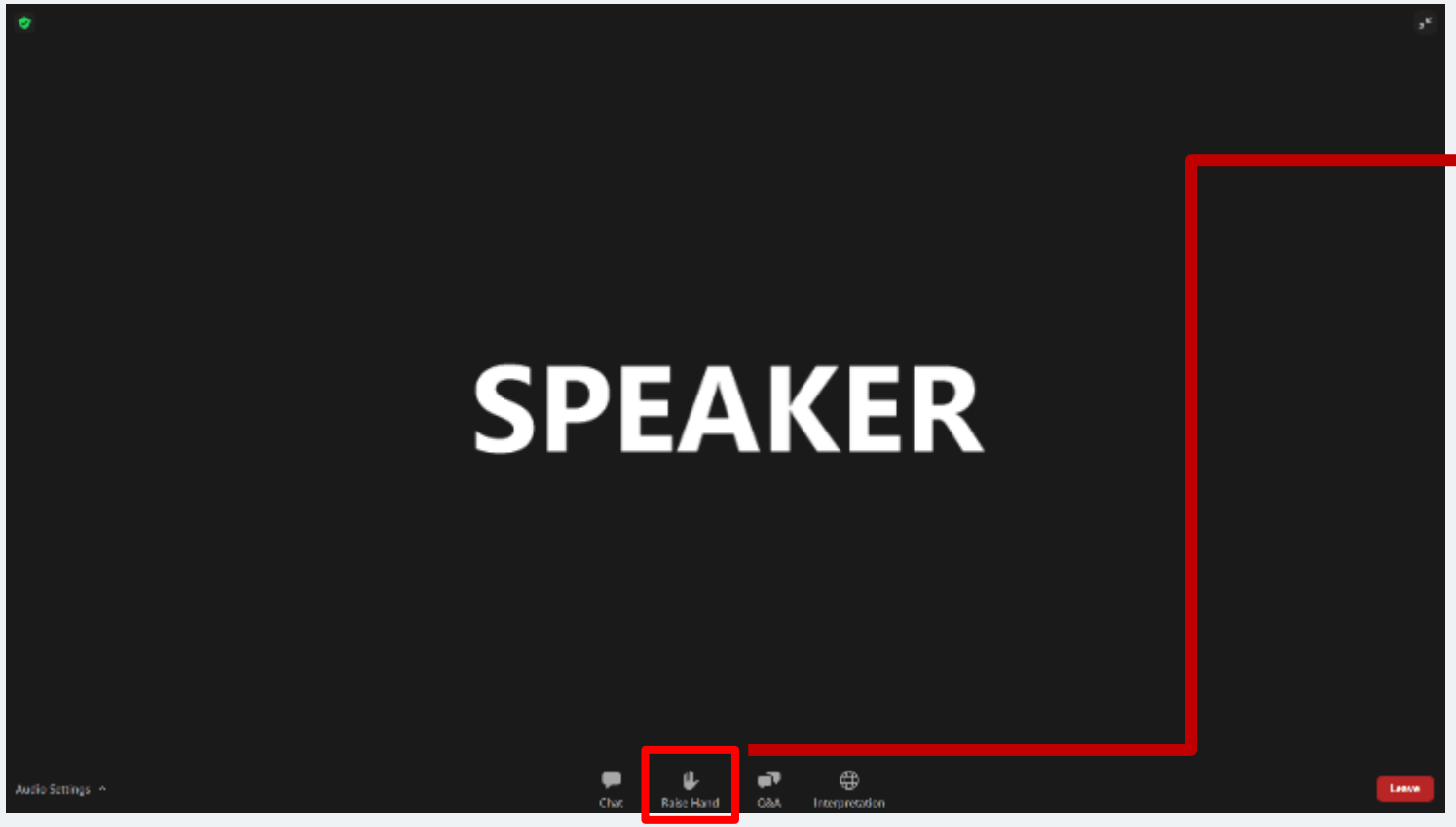




Comments and questions can be submitted through the chat window.

Los comentarios y las preguntas se pueden enviar a través de la ventana de chat.

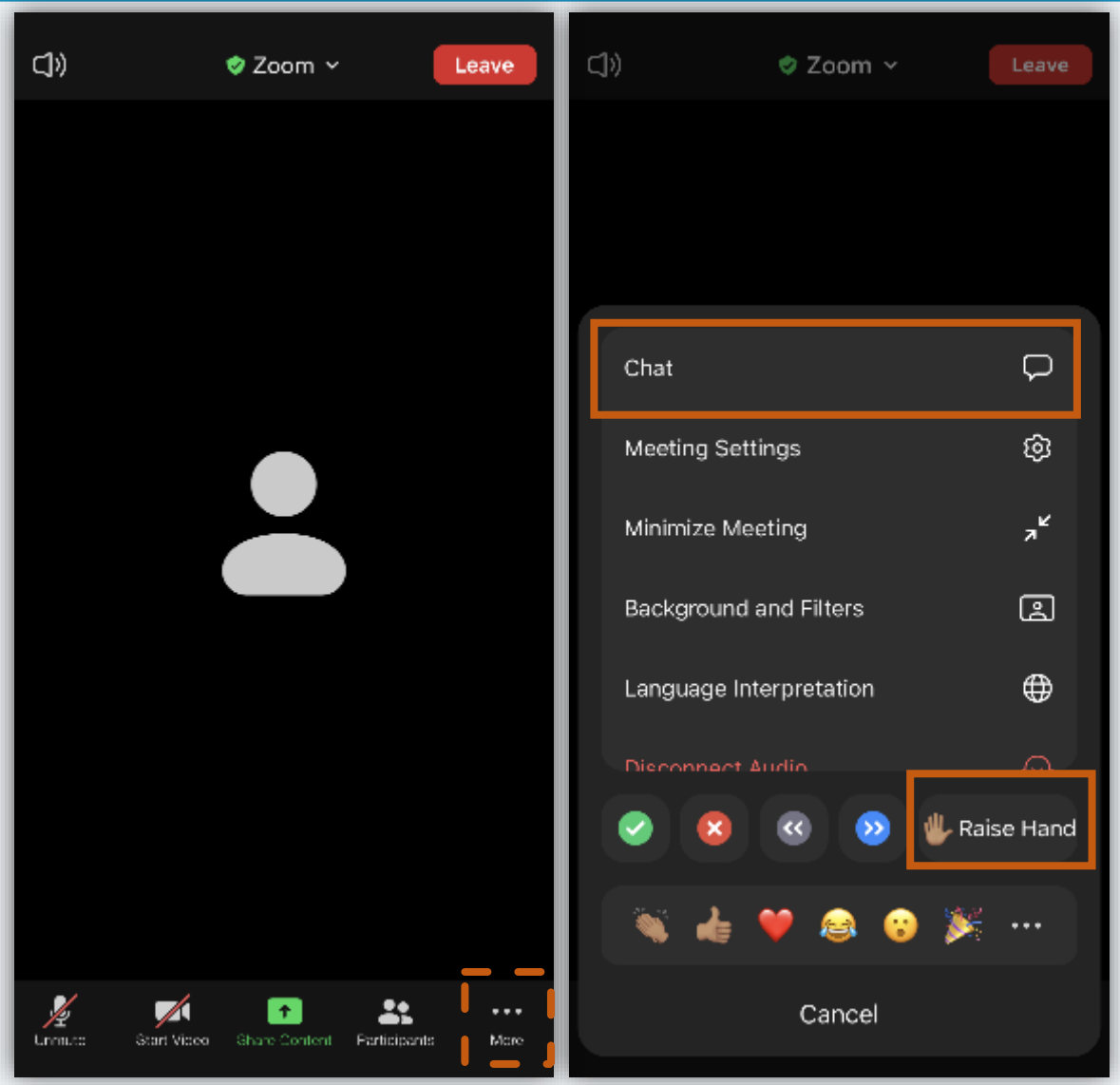
How to use Zoom // *Cómo Usar Zoom*



During the discussion, if you would like to speak over the audio, please raise your hand (otherwise questions and comments can be submitted through the Chat window)

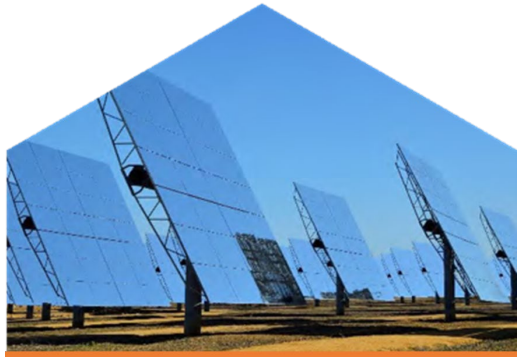
Durante el debate, si desea participar de manera oral, por favor, levante la mano (de lo contrario, las preguntas y comentarios pueden presentarse a través de la ventana de Chat)

On your Phone // *En su teléfono móvil*



Role of Working Groups

BUILDINGS



ELECTRICITY

FOOD SYSTEMS & CIRCULAR ECONOMY

LAND USE & NATURAL CLIMATE SOLUTIONS

TRANSPORTATION

Today's Agenda

- Welcome
- Stakeholder Presentations
  - Dani Makous, Building Electrification Institute and Facilitator Questions
  - Ginger Hitzke, Hitzke Development Corporation and Facilitator Questions
  - Sean Ellis, UA Local Union 230 and Facilitator Questions
- Implementation Playbook & Actions Matrix
- Open Discussion
- Closing

GETTING TO ZERO

SAN DIEGO COUNTY
REGIONAL DECARBONIZATION FRAMEWORK

Decarbonizing Buildings

Dani Makous

Building Electrification Institute

Idea #1

San Diego County RDF Building Working Group

November 1, 2022

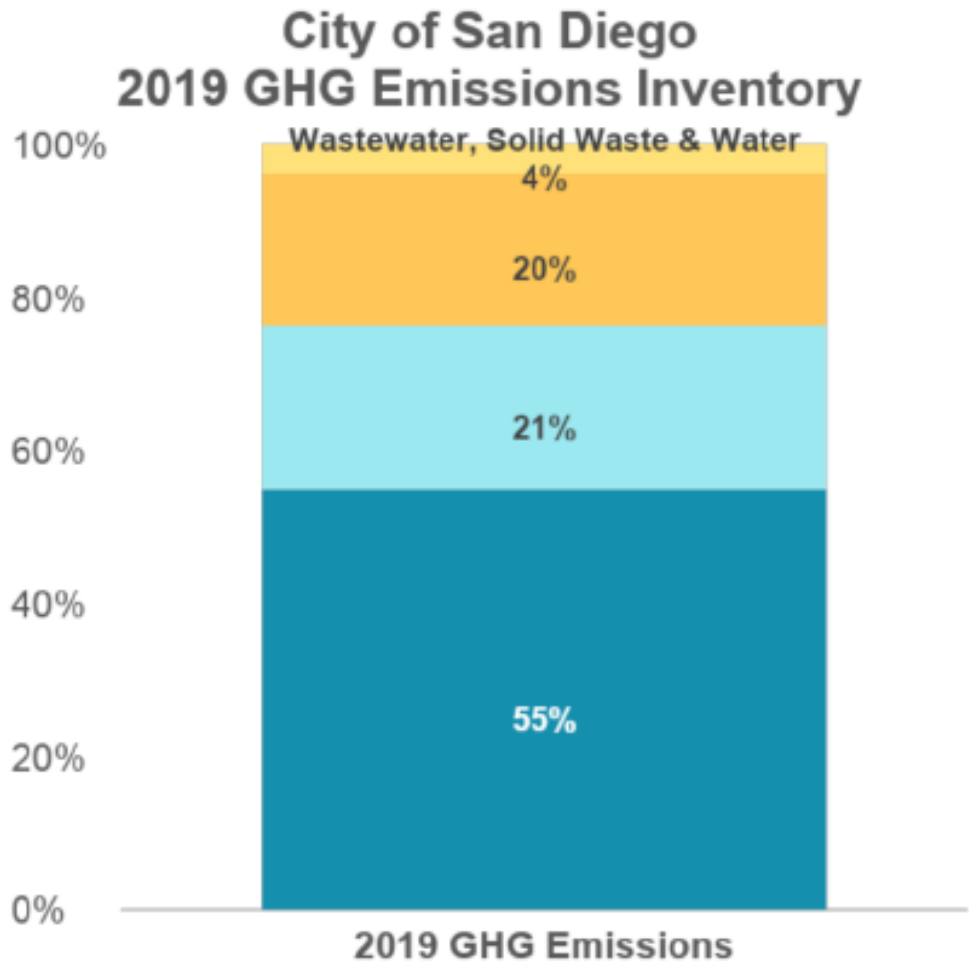
Table of Contents

The Need for Existing Building Policy Requirements + Supportive Programs

Building Electrification Institute
CITIES DRIVING CHANGE

Need for Existing Building Policies | Climate

- **On-site fossil fuel use in buildings accounts for 10% of U.S. greenhouse gas (GHG) emissions.**
  - Gas is used in space heating, water heating, stoves, and dryers.
- **Within cities, this proportion can be much greater.**
  - On-site fossil fuels account for 20% of GHG emissions in the City of San Diego.



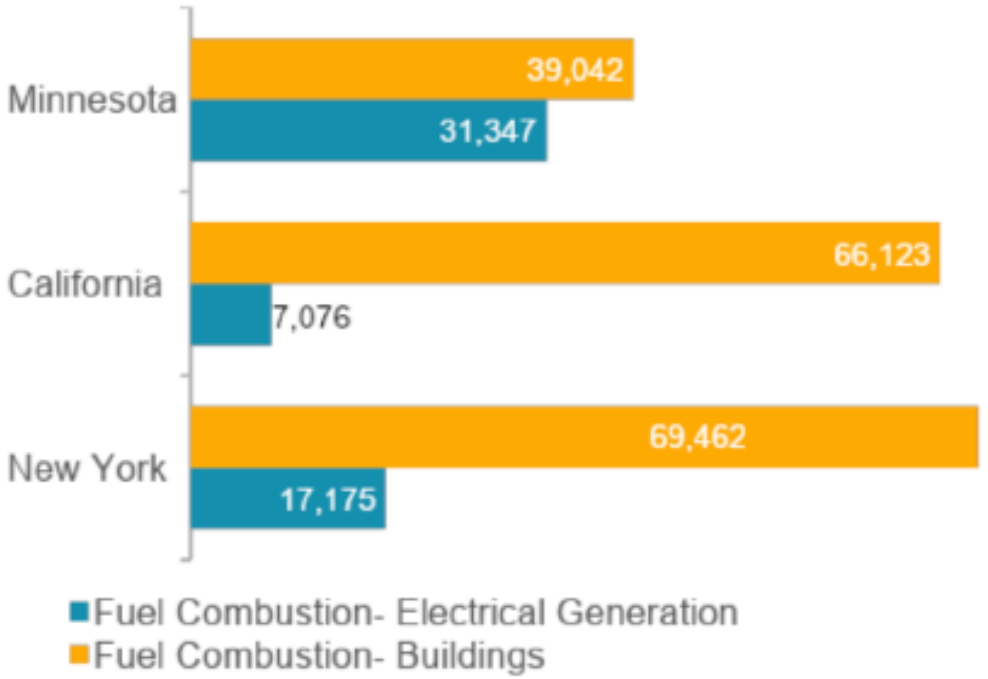
Sources: (1) RMI, The Economics of Electrifying Buildings, 2018; (2) Boston Green Ribbon Commission, Boston University, Carbon Free Boston, 2019

Building Electrification Institute

Need for Existing Building Policies | Health

- In many states, **fossil fuel combustion in buildings results in more NOx emissions than power plants.**
- Gas appliances are linked to poor indoor air quality. In homes with gas stoves, **children have a 42% increased risk of developing asthma.**
- Carbon monoxide, which results from burning gas, results in roughly 15,000 emergency room visits and 500 deaths in the U.S. annually.

2014 NOx Emissions by Source (tons)



Notes:

- "Electric Generation" includes biomass, coal, natural gas, oil, and other fuels combusted to generate electricity.
- "Buildings" includes biomass, coal, natural gas, oil, and other fuels combusted for commercial, institutional, residential, and industrial boilers.

Sources: EPA, 2014 National Emissions Inventory Report; Berkeley Lab, Pollution in the Home: Kitchens Can Produce Hazardous Levels of Indoor Pollutants, 2013; EPA, Preventing Carbon Monoxide Poisoning, 2009. Chart Source: EPA National Emissions Inventory (2014)

Existing Building Policies | Benefits & Challenges

Benefits

- Potential to lower utility costs for owners and tenants
- Opportunity to build an inclusive, organized workforce and provide high-road jobs
- Guarantee deep GHG emission reductions to reach climate goals
- Expand healthy indoor environments for homes and businesses

Challenges

- Risk of increased housing and energy costs
- Significant financial and technical support often needed for building compliance
- Significant stakeholder engagement needed to plan and implement effective policies

Potential Policy Requirements + Approaches

For Building Owners:

- Building Performance Standards (BPS)
- Replacement on Burnout Requirement
- Date-certain Equipment Phase-out
- Appliance Emissions Standards
- Rental Efficiency Standards
- Point of Sale Requirements

Potential Utility-Scale Approaches:

- Electrification Targets
- Strategic Gas Decommissioning
- Utility Scale Geothermal

Need for Supportive Programs

- **Public funding is necessary to ensure that retrofit costs are not borne by low-income communities and renters**, which could exacerbate equity and housing affordability concerns.

- **Electrification retrofits must be paired with energy efficiency, electric readiness, and health and safety retrofits** to holistically address building needs and ensure energy bill savings.

- **"One-Stop Shop" programs are needed to help building owners complete upgrades and identify/stack funding and financing options.**

Leading with Co-Creation

Building Electrification Institute
CITIES DRIVING CHANGE

Community Co-creation

"Community co-creation" is a process of deep, iterative collaboration between government staff and leaders rooted in and accountable to historically marginalized communities.

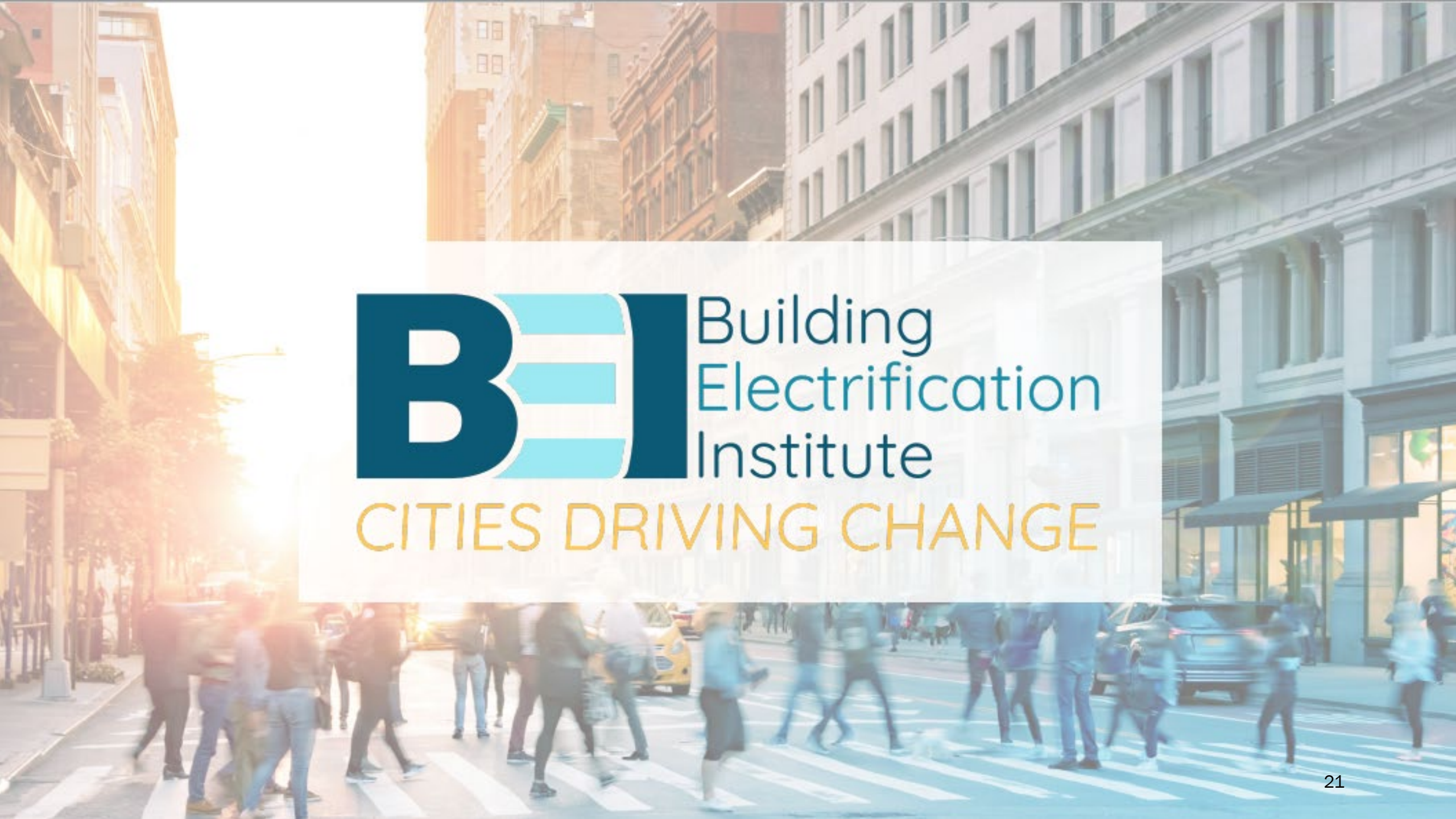
THE SPECTRUM OF COMMUNITY ENGAGEMENT TO OWNERSHIP

Image Source: Facilitating Power and Movement Strategy Center, *Spectrum of Community Engagement to Ownership*

Community Co-creation

A "community co-creation" process requires:

- **Engaging with community-based organizations ("CBOs") or community leaders** early and throughout the planning process
- **Dedicating resources to the process**, including staff time and funding
- **Maintaining flexible timelines** to allow for relationship-building
- **Acknowledging harmful histories** between government and communities of concern
- **Taking the time for building the capacity of local CBOs** and other leaders
- **Sharing decision-making power** with community co-creation partners


Building
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Institute
CITIES DRIVING CHANGE

GETTING TO ZERO

SAN DIEGO COUNTY
REGIONAL DECARBONIZATION FRAMEWORK

Decarbonizing Buildings

Ginger Hitzke

Hitzke Development Corporation

Idea #2

Crises of affordable housing and climate change

Impact of climate change on low-income households

Possible solutions on climate action that builds affordability

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Idea #2

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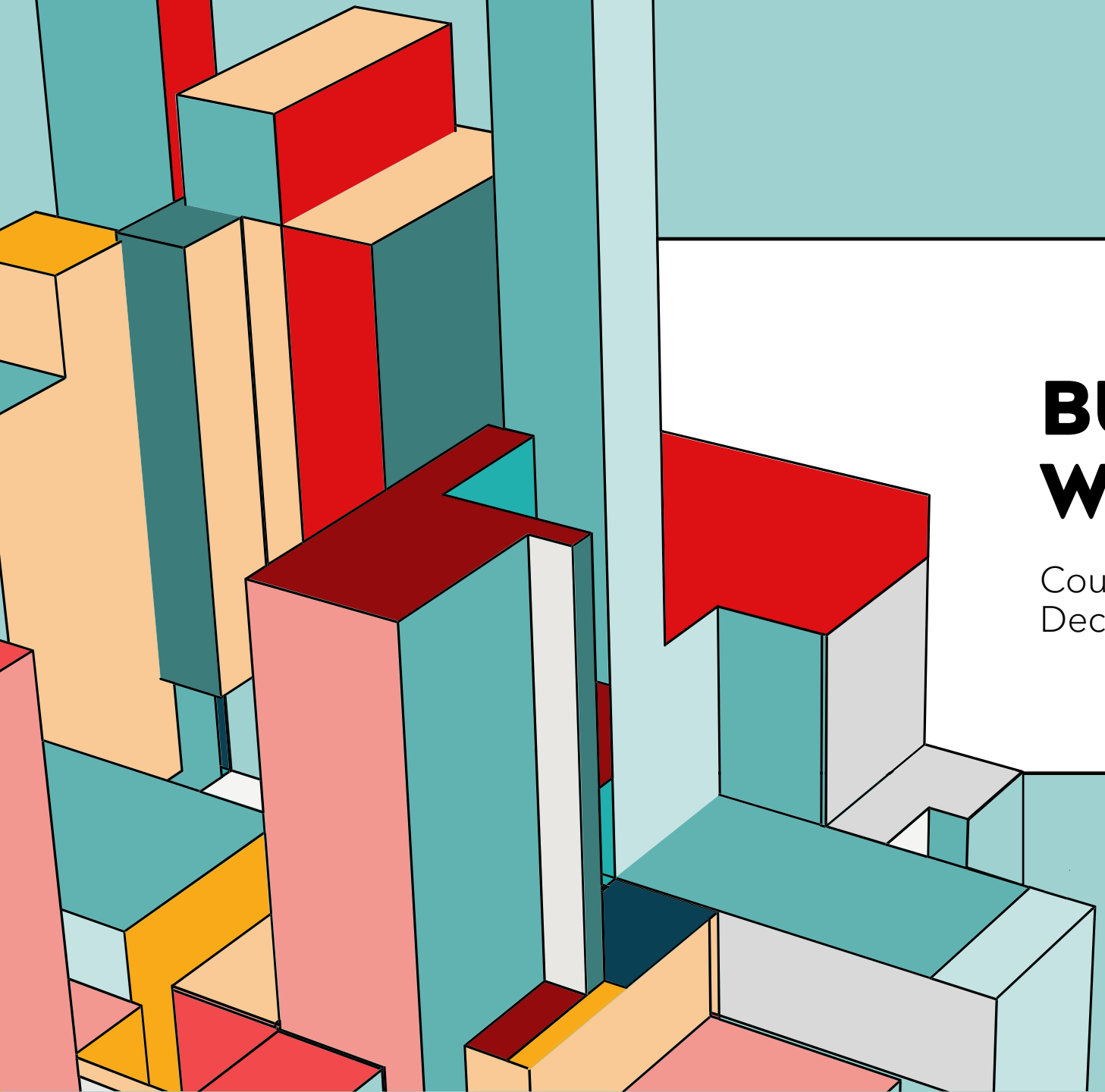
REGIONAL DECARBONIZATION FRAMEWORK

Decarbonizing Buildings

Sean Ellis

United Association Local Union 230

Idea #3

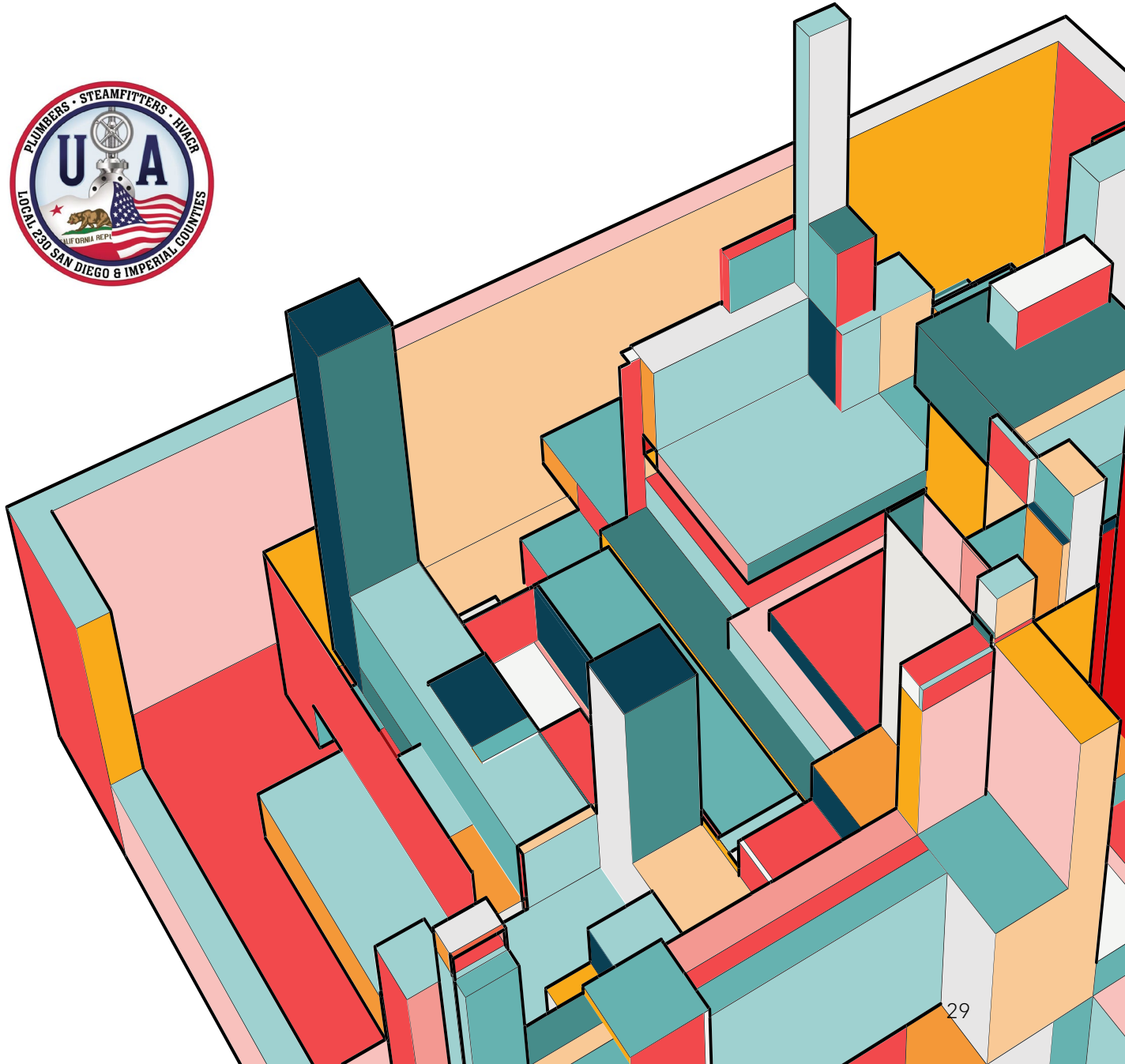


BUILDING WORKSHOP

County of San Diego Regional Decarbonization Framework

ABOUT US

The United Association of Plumbers, Steamfitters, Refrigeration & HVAC Service Technicians Local Union 230 is proud to be the oldest, continuously operating craft union in San Diego. Our members are the piping professionals that provide the San Diego Community with the complex piping systems that are responsible for potable water, sanitary systems, medical gas, heating, cooling, and purity piping for the pharmaceutical and micro-electronic industries along with an array of other services that help make San Diego America's Finest City.



BUILDING DECARBONIZATION

GHG EMISSIONS

Built environment- commercial, residential, county owned buildings, hospitals, shopping centers, schools and more

COMMUNITY

San Diego County regional residents, visitors, and businesses

GRID RELIABILITY

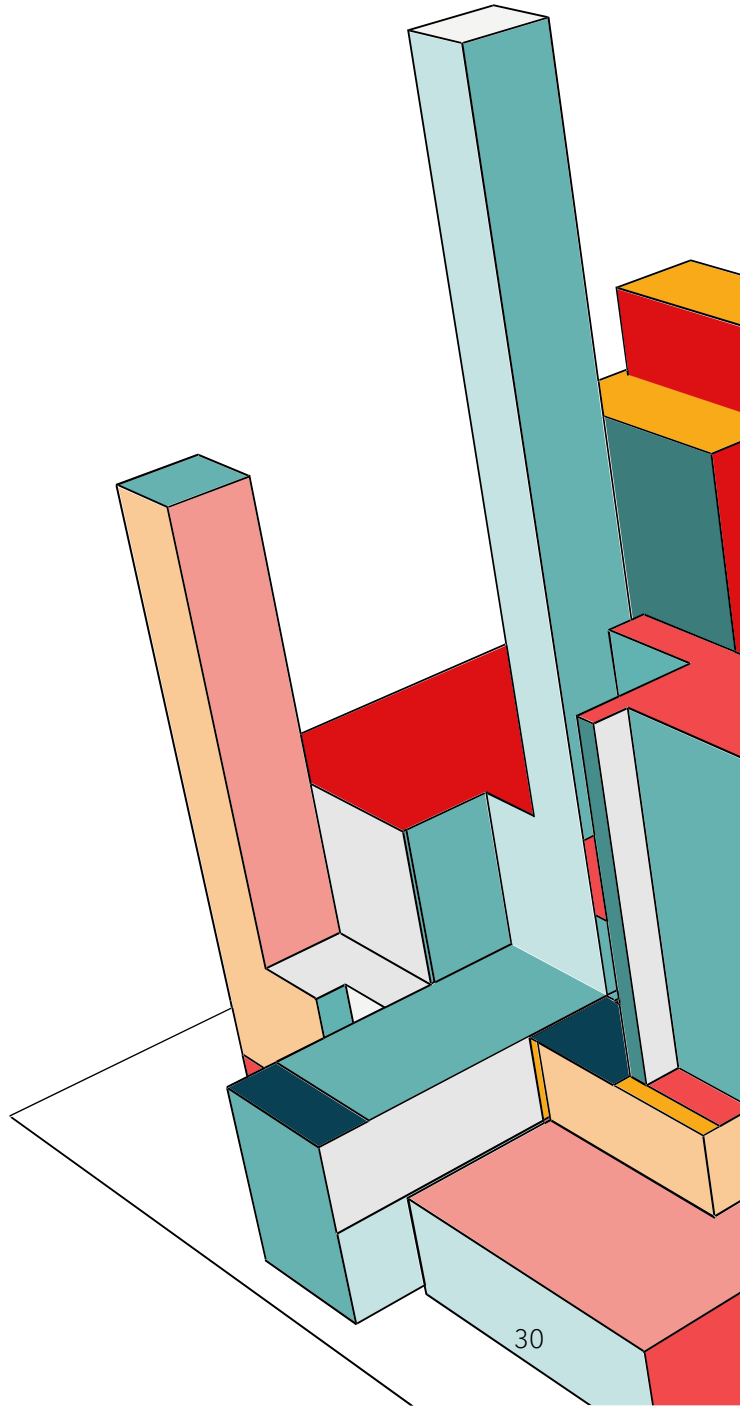
Our region has experienced power outages, brown outs, and flex alerts due to extreme weather events and drought.

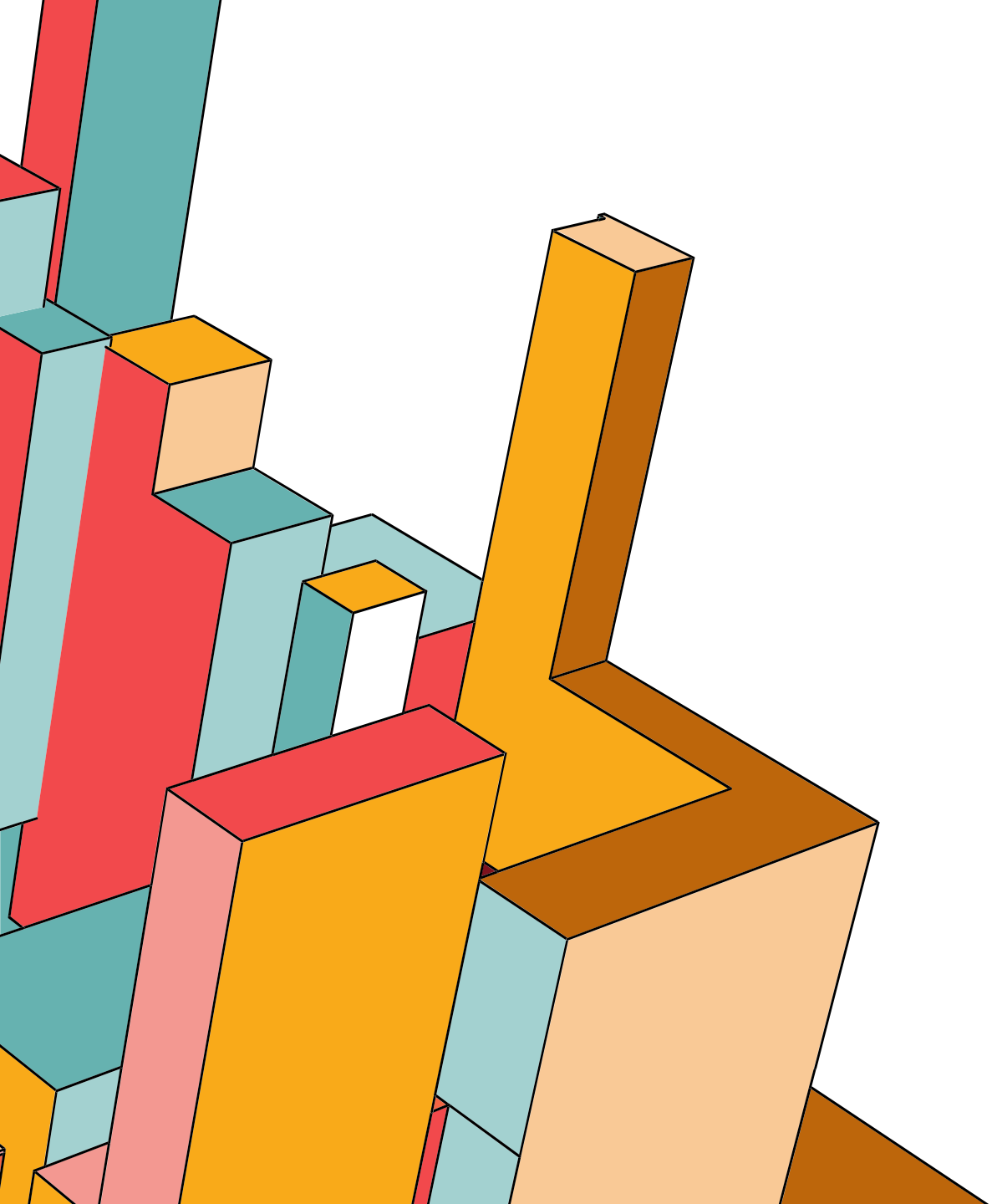
COSTS

Currently San Diego region has fluctuating cost of energy due to gas global economy and weather dependent electricity. Outages and unpredictability of supply increases cost to consumer.

USABILITY

Existing infrastructure as well as new developments





SOLUTIONS

CIRCULAR ECONOMY

Increase the supply of net zero bioenergy from a circular economy that provides baseload, continuous, regional energy that is cost effective and not weather dependent.

FUEL CELL MICROGRID

San Diego County region- existing infrastructure and new developments

DISTRICT ENERGY

Increasing regional supply of bioenergy and hydrogen will deliver a more dependable energy supply leading to steady cost as well as decrease GHG for all

ENERGY REDUCTION

Onsite water reuse, High Efficiency Heat pump- Electric or Geothermal, Waste heat recovery

FUEL CELL MICROGRIDS

INPUT

Hydrogen, Biogas, or Natural gas

OUTPUT

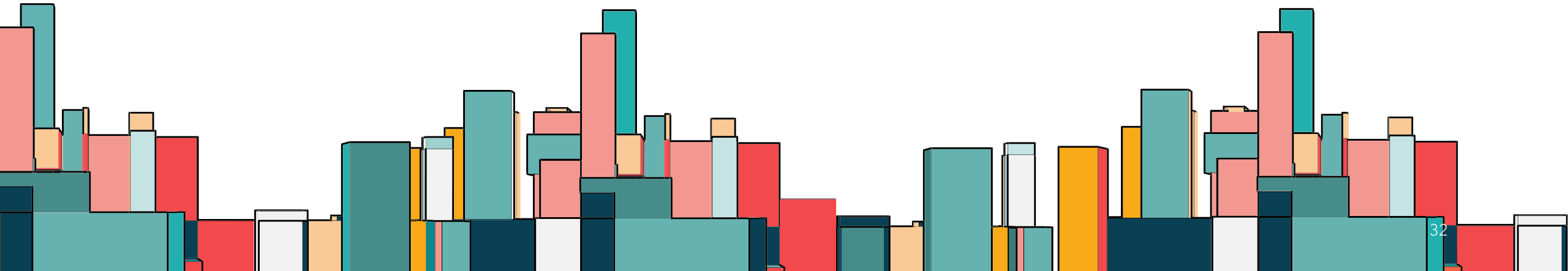
Clean reliable electricity that is not weather dependent and can help stabilize the grid

GHG EMISSIONS

Hydrogen= Zero Emissions, Biogas= Net Zero GHG
Natural gas= Low GHG

COST

Low stabilized cost of electricity due to continuous supply from renewable fuels. Also, fuel cell microgrid can still run whether the grid is operating or not.

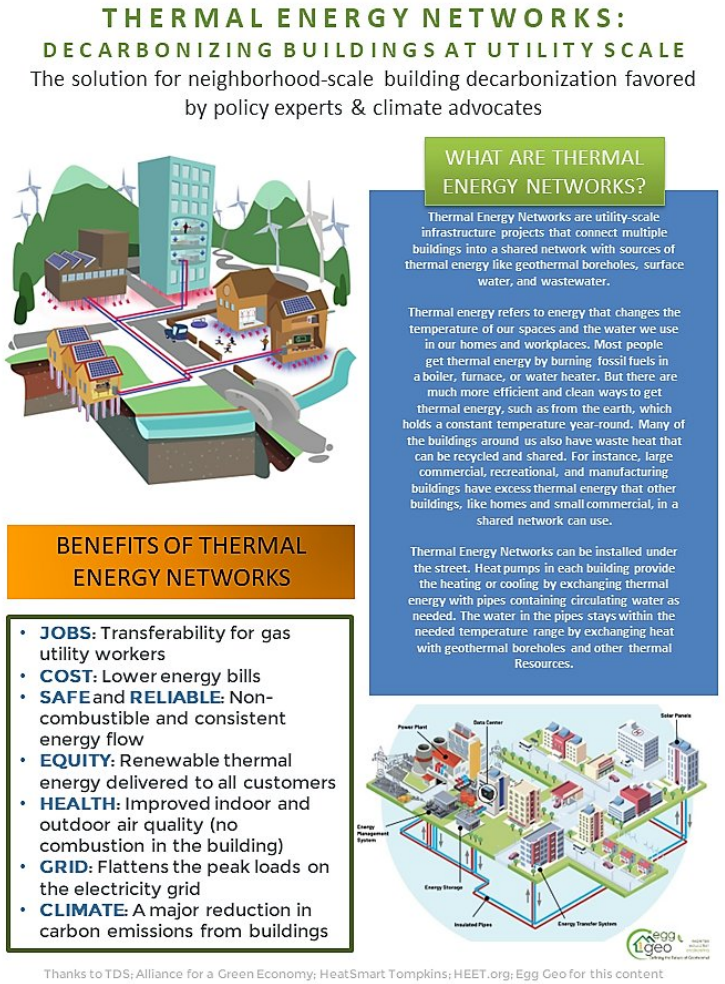


FUEL CELL TECHNOLOGY AT USD

- "USD's campus consumes a lot of electricity during times that the solar installation does not provide electricity and the fuel cell allows USD to further reduce its emissions with a cost-effective energy source."

  -Michael Catanzaro Director of Sustainability

HIGH PERFORMANCE BUILDING STRATEGIES



- Thermal Energy Exchange- Geothermal exchange Heat Pumps
- Geothermal heat pump systems use 25%-50% less energy than electric heat pumps
- Heat transfer between buildings
- https://www.phcppros.com/articles/15588-how-to-construct-a-us-geothermal-energy-network
- Wastewater Energy Exchange

GEOTHERMAL TECHNOLOGY

- According to NRDC:
  - Geothermal technology that has been around for decades: connecting buildings via underground pipes to a joint "thermal loop" fed by shared geothermal well fields.
  - A variety of names are being used to describe this concept, including "district thermal" or "district loop heating."
  - Under the right conditions, networked geothermal can be a powerful new tool in our building decarbonization arsenal.
- https://www.nrdc.org/experts/joe-obrien-applegate/what-we-need-know-harness-heat-beneath-our-feet

ADDITIONAL RESOURCES

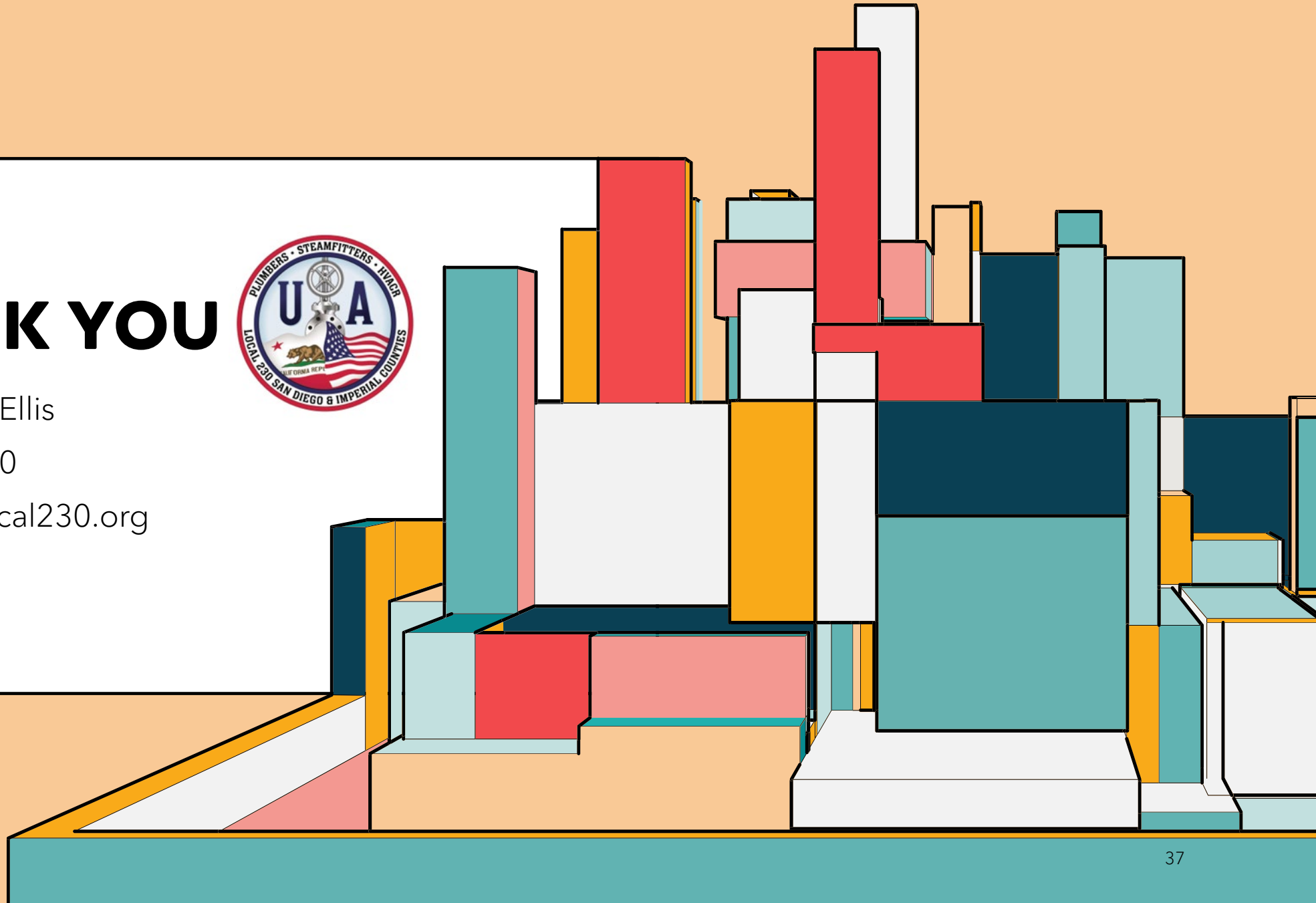
- https://www.energy.gov/eere/bioenergy/bioenergy-basics
- https://www.energy.gov/eere/fuelcells/hydrogen-production-biomass-gasification
- https://www.energy.gov/sites/default/files/2022-09/Industrial%20Decarbonization%20Roadmap.pdf
- https://www.epa.gov/agstar/renewable-natural-gas-agricultural-based-adbiogas-systems
- Waste-to-Energy: a reality for affordable heating in local districts (eswet.eu)
- https://www.energy.gov/eere/articles/10-things-you-might-not-know-about-hydrogen-and-fuel-cells
- https://www.bloomenergy.com/applications/alwayson-microgrids/
- https://www.bloomenergy.com/wp-content/uploads/hydrogen-data-sheet.pdf
- https://www.governor.ny.gov/news/governor-hochul-announces-progress-toward-implementing-utility-thermal-energy-network-and-jobs
- https://www.iea.org/reports/district-heating

THANK YOU

Sean-Keoni Ellis

UA Local 230

Sean@UAlocal230.org



Implementation Playbook: Level of Approach

Organizational Operations

Community

Region

Playbook Implementation Mechanisms

- Analysis/Research
- Capital Project
- Education
- Incentive
- Partner/Collaborate
- Plan
- Program
- Requirement/Policy

Playbook Criteria

- GHG Reduction Potential
  - Relative GHG reduction compared to other actions
  - Some actions have no direct reduction (e.g., education)
    - Difficult to estimate GHG impact of an education webpage
    - Methods to estimate GHG impact of adding bike lanes

- Time to Complete
  - Relative time it would take to complete an action
  - Quicker to add a page to a website than to build bike lanes

- Cost to Implement
  - Relative cost to implement an action
  - Cheaper to add a page to a website than build bike lanes

Playbook Criteria

- Preliminary Estimates
  - “Average” of the category of actions
  - Not possible to comment on all potential actions
    - Education could be: page of a website or a TV commercials
  - Intended to provide initial screening for decision making
- Other Considerations
  - Co-benefits of actions (e.g., air pollution, environmental quality, and public health)
    - Primary concern of RDF is GHG emissions
  - Workforce and equity

Organization (more actions in the online document)

Buildings				
Energy Efficiency				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Conduct audits and evaluate existing facilities to quantify energy use, and identify and quantify energy efficiency and conservation opportunities.	Analysis/Research	0-2 yrs	N/A	L-M
Implement energy efficiency projects at existing facilities and sites (e.g., lighting, HVAC, pumping, etc.)	Capital Project	5 yrs +	M	M-H
Develop a process to track and disclose energy use to the public and employees	Capital Project	3-5 yrs	L	M-H
Convert streetlights, traffic signals, and outdoor lighting (including parks) to LED or other efficient lighting technology and monitor with energy management system (municipal operations)	Capital Project	3-5 yrs	L	M-H
Electrification				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Conduct an analysis to determine the feasibility and timeline to convert existing building appliances and equipment to electric	Analysis/Research	0-2 yrs	N/A	L-M
Identify financial incentives and grants to offset cost of installing electric appliances and equipment in existing facilities	Analysis/Research	0-2 yrs	N/A	L-M
Install electric appliances and equipment in existing facilities	Capital Project	0-2 yrs	M	M-H
Develop and implement an education programs for employees to purchase electric appliances	Education	0-2 yrs	N/A	L-M

Community (more actions in the online document online document)

Buildings				
Energy Efficiency				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Conduct a regional analysis of the existing building stock to help develop policies and programs	Analysis/Research	0-2 yrs	N/A	L-M
Conduct an equity analysis to help develop building-related policies and programs	Analysis/Research	0-2 yrs	N/A	L-M
Develop a program to educate public and building owners about energy performance, auditing, benchmarking, and disclosure	Education	0-2 yrs	N/A	L-M
Develop an education program to promote energy efficiency improvements in residential and non-residential buildings	Education	0-2 yrs	N/A	L-M
Electrification				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Conduct an analysis of existing buildings to help develop an electrification policy	Analysis/Research	0-2 yrs	N/A	L-M
Conduct an equity analysis to help develop building electrification policies and programs	Analysis/Research	0-2 yrs	N/A	L-M
Conduct analysis to determine potential approaches to neighborhood electrification and natural gas pruning strategies	Analysis/Research	0-2 yrs	N/A	L-M
Identify financial incentives and grants to offset cost of installing electric appliances and equipment in residential and non-residential existing buildings	Analysis/Research	0-2 yrs	N/A	L-M

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Region (more actions in the online document)

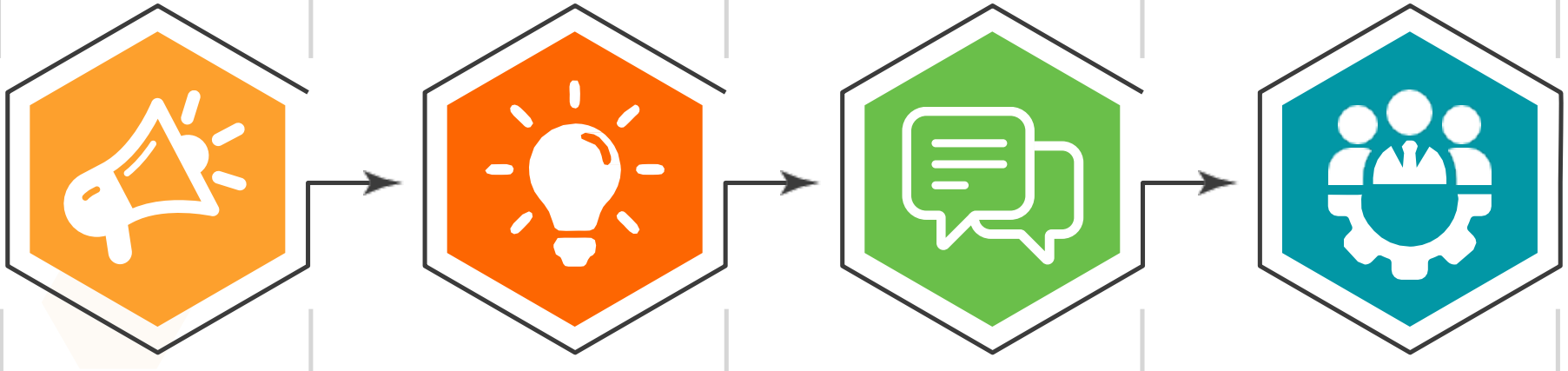
Buildings				
Energy Efficiency				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Complete an analysis of local energy codes by jurisdiction and climate zone to identify opportunities for additional building energy efficiency in existing buildings	Analysis/Research	3-5 yrs	N/A	L-M
Complete an analysis of local energy codes by jurisdiction and climate zone to identify opportunities for additional building energy efficiency in new buildings	Analysis/Research	3-5 yrs	N/A	L-M
Conduct a regional analysis of the existing building stock to help develop policies and programs	Analysis/Research	3-5 yrs	N/A	L-M
Electrification				
Activity	**Implementation Mechanism**	**Estimated Time to Complete**	**Estimated Potential GHG Impacts**	**Estimated Cost to Implement**
Complete a regional local energy codes analysis to identify opportunities for further action to develop policies for existing buildings by jurisdiction and climate zone	Analysis/Research	3-5 yrs	N/A	L-M
Conduct a regional analysis of existing buildings to inform regional and communitywide policies and programs	Analysis/Research	3-5 yrs	N/A	L-M
Complete a regional local energy codes analysis to identify opportunities for further action by jurisdiction and climate zone (new)	Analysis/Research	0-2 yrs	N/A	L-M
Low-Carbon Fuels				
Complete a regional local energy codes analysis to identify opportunities for further action to develop policies for new buildings by jurisdiction and climate zone	Analysis/Research	3-5 yrs	N/A	L-M
Conduct a regional analysis of existing building stock to inform regional and communitywide policies and programs	Analysis/Research	3-5 yrs	N/A	L-M

What we need from you…

1. In your experience what has worked or not worked in terms of existing policies?
2. What programs could benefit underserved communities or have adverse impacts?
3. What are solutions that are not in the database?

Timeline

Also: Building matrix of actions is on the Engage site for your feedback!



PROGRAM DETAILS

- Public Workshop
- Completion of Technical Report & Workforce Development Reports
- Special Topic Working Groups
- Implementation Playbook 1st Draft Released
- Draft Sustainable Agriculture & Food Systems Policy Report
- Final Implementation Playbook

Implementation Playbook & Framework Adoption

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