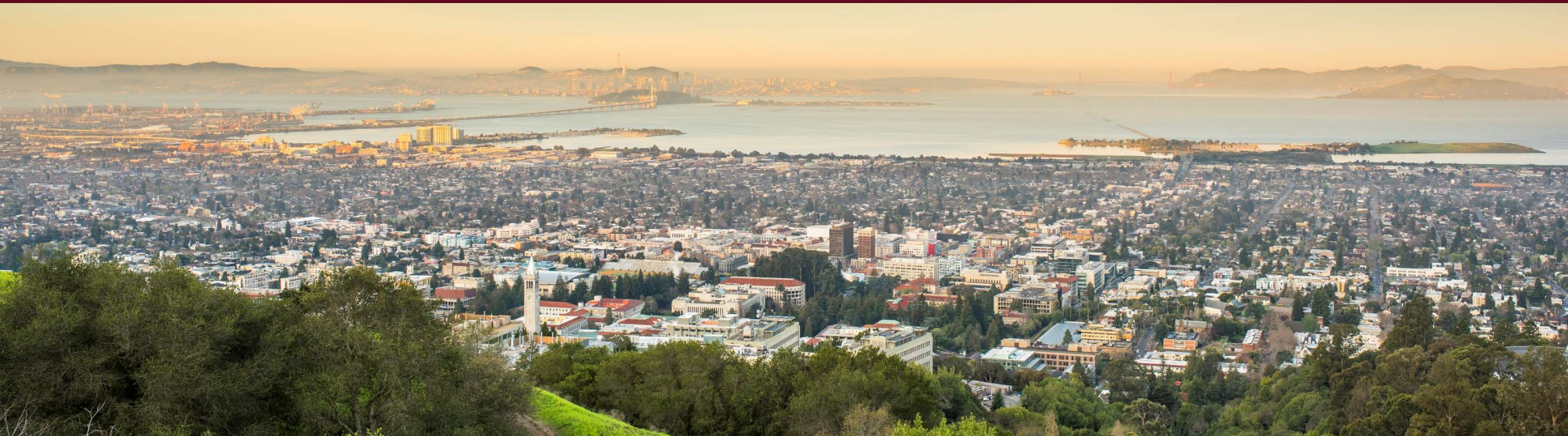
Berkeley Existing Buildings Electrification Strategy

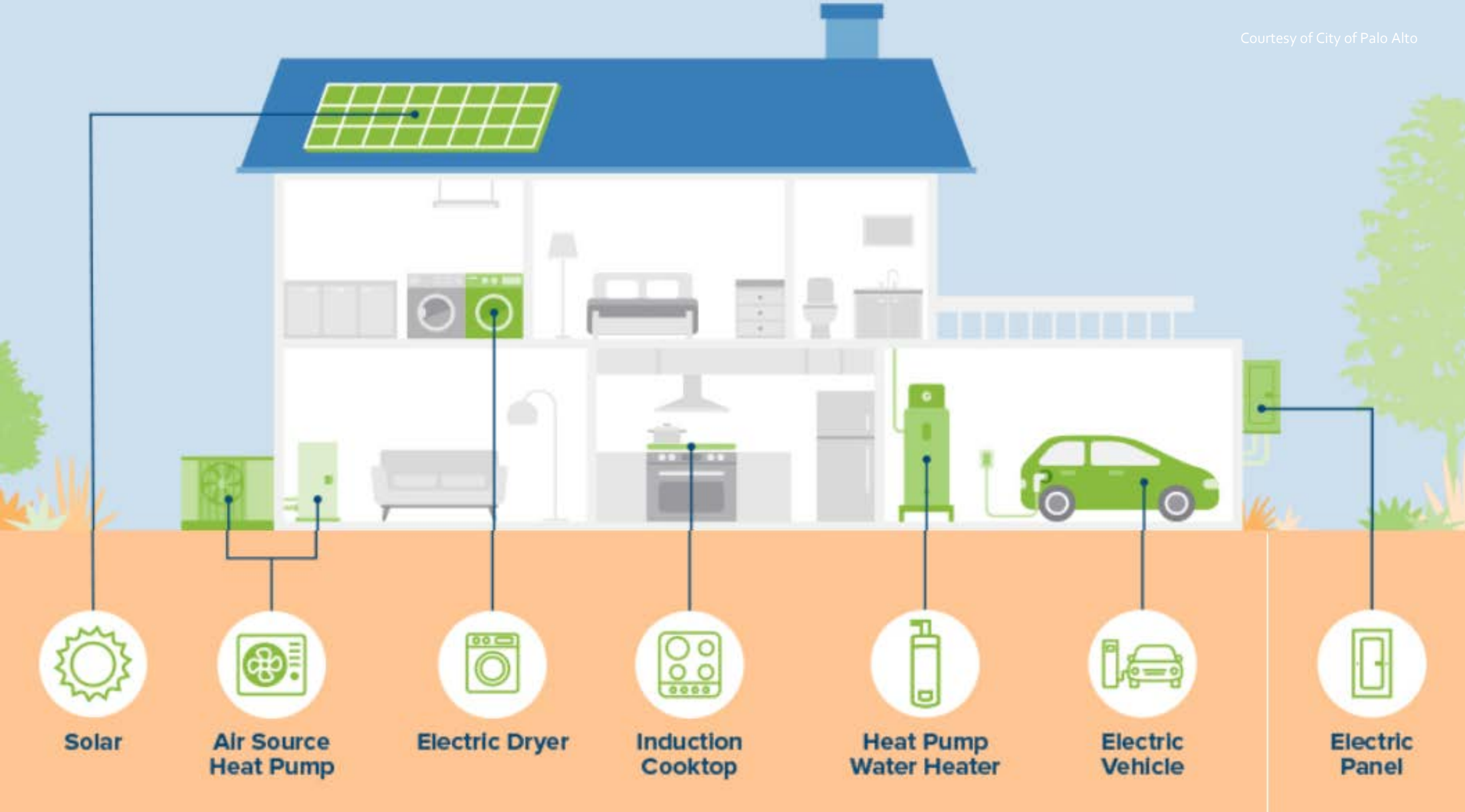
Presentation to Rent Board

May 6 , 2021



- Building Electrification 101
- Existing Buildings Electrification Strategy
- Next Steps
- Discussion

Courtesy of City of Palo Alto



Clean Energy

EAST BAY COMMUNITY ENERGY

Renewable 100

ebce.org/change-my-plan

How Do We Electrify?

Air Source Heat Pump provides heating & cooling

Heat Pump Water Heater (HPWH)

Induction Range

Heat Pump Clothes Dryer

Change out gas appliances for electric appliances

Electrification Benefits

Climate Change

Cost Savings

Health & Comfort

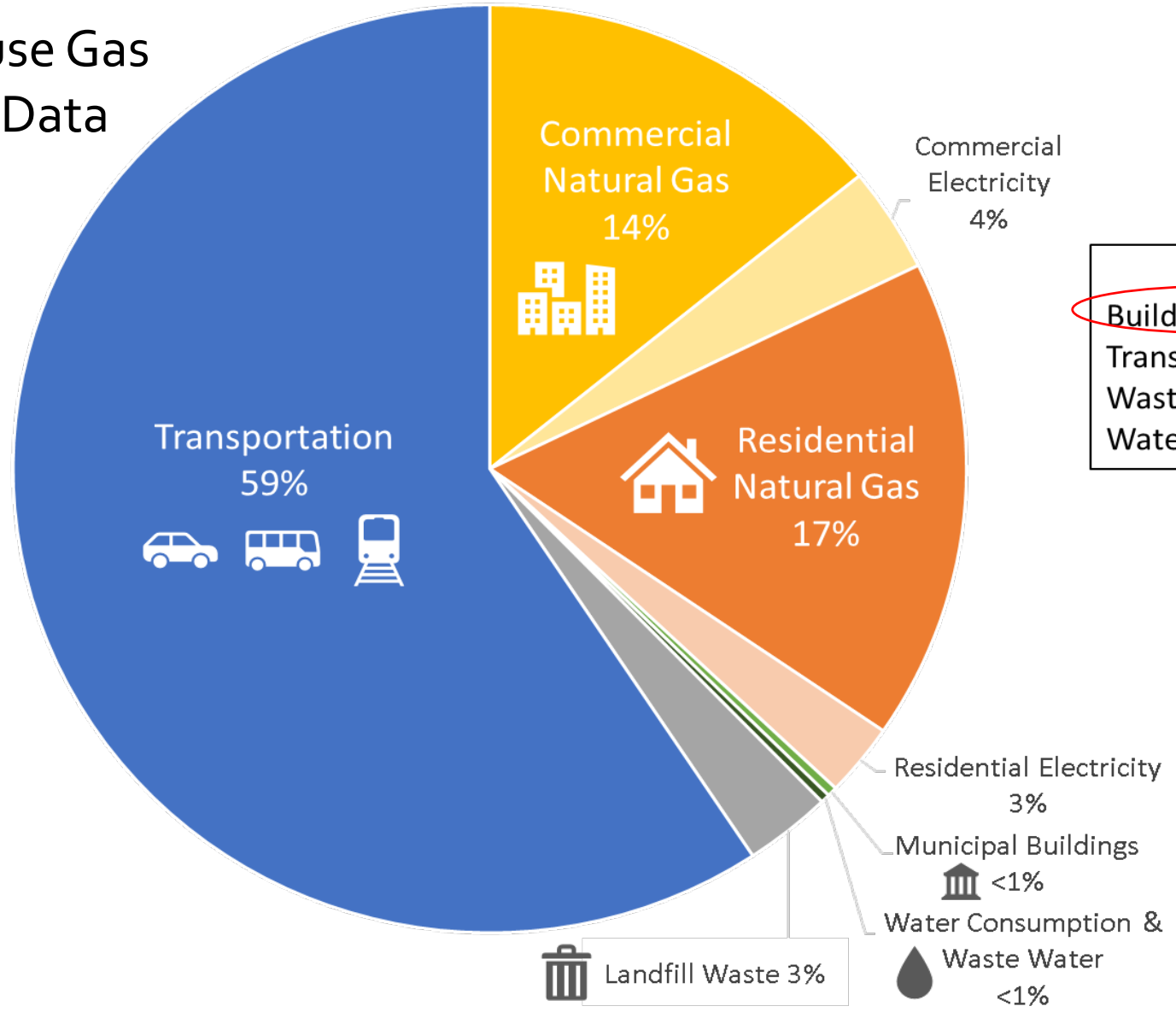
Resiliency & Safety

Equity

Green Jobs

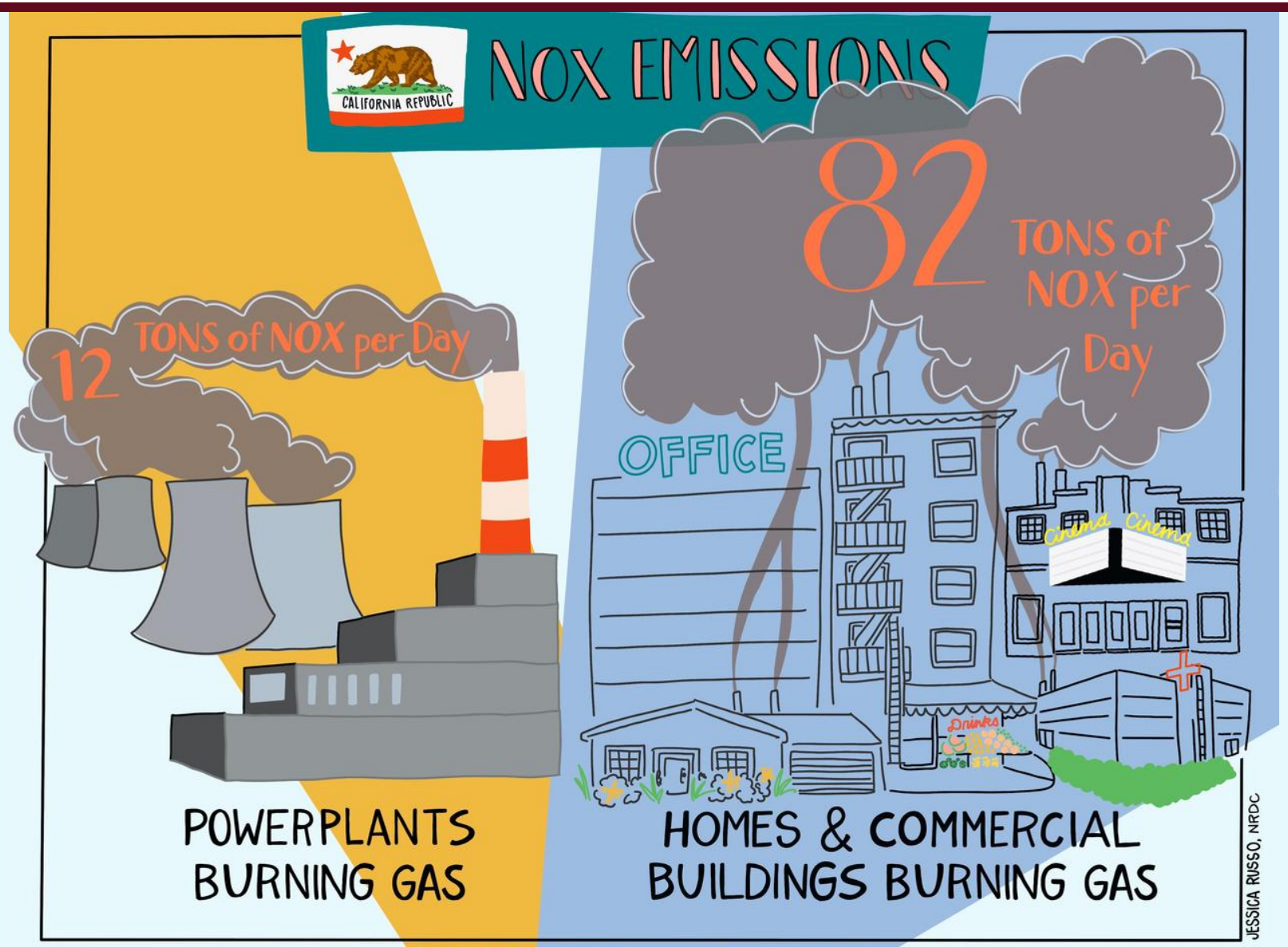
Climate Change

Berkeley Greenhouse Gas Inventory – 2018 Data



Summary:
Buildings: 37%
Transportation: 59%
Waste: 3%
Water: <1%

Pollution


CALIFORNIA REPUBLIC
NOX EMISSIONS
12 TONS of NOX per Day
82 TONS of NOX per Day
OFFICE
Cinema
Drinks
POWERPLANTS BURNING GAS
HOMES & COMMERCIAL BUILDINGS BURNING GAS
JESSICA RUSSO, NRDC
SOURCE: CALIFORNIA AIR RESOURCES BOARD 2019 NOx EMISSIONS ESTIMATES

Indoor Air Quality & Health Equity

Pollution from gas stoves is linked to:

- Aggravated respiratory symptoms
- Irritated airways
- Increased risk of asthma in children
- Cardiovascular effects

Indoor air quality can be 5x higher than allowable outdoor air quality standards.

Induction Cooking - Safety

Comfort & Equity

Gas Costs

$

Gas Cost

Gas use is expected to decrease by as much as 90% as more people electrify their homes and buildings

Gas rates are projected to increase significantly as residential gas demand decreases

Analysts forecast a 3-10x increase in gas costs by 2050

Gas Use

Resiliency & Safety

Resiliency

Solar + battery storage can provide clean, reliable electricity even during power outages

AP Photo/Michael Shah

Safety

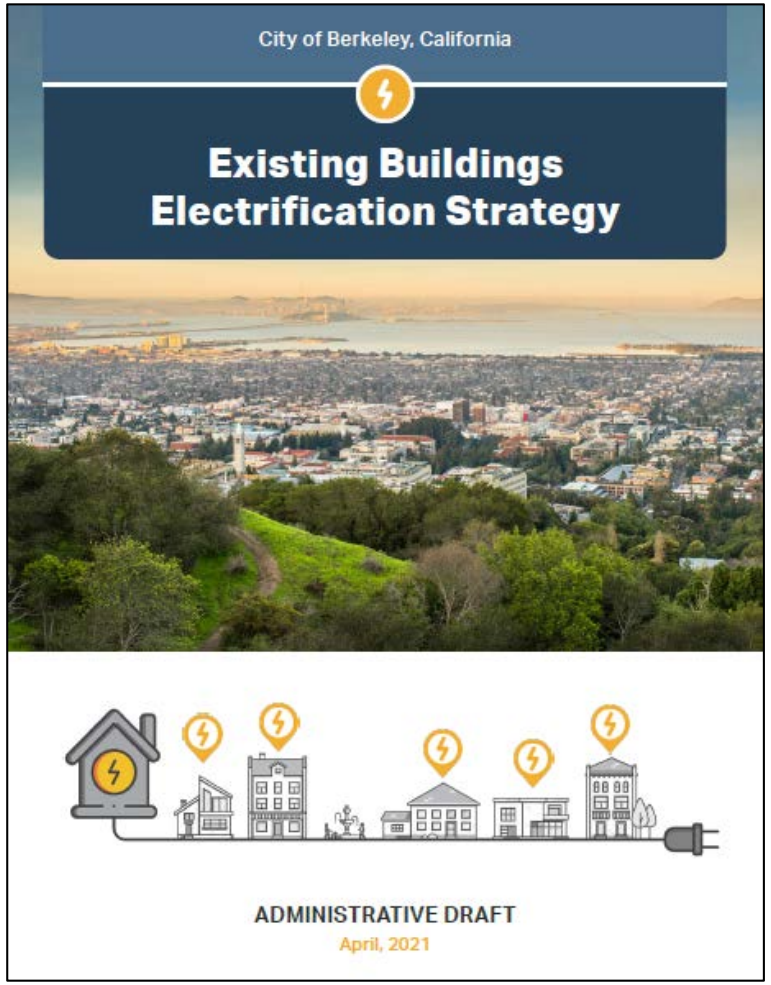
Natural gas lines can cause explosions and additional safety risks during disasters

High Quality Green Jobs

- Building Electrification 101
- **Existing Buildings Electrification Strategy**
- Next Steps
- Q & A

Project Scope

- Equitable electrification of all existing buildings
  - Determine date possible
  - Provide short- and long-term solutions
  - Focused on low-rise residential buildings
- Building stock analysis
- Cost & savings modeling data analysis
- Community engagement



www.cityofberkeley.info/electrification

Team

- Rincon Consultants
- RMI (formerly Rocky Mountain Institute)
- The Ecology Center

- *Additional support from:*
  - Building Electrification Institute
    - Upright Consulting
    - Inclusive Economics
  - RMI

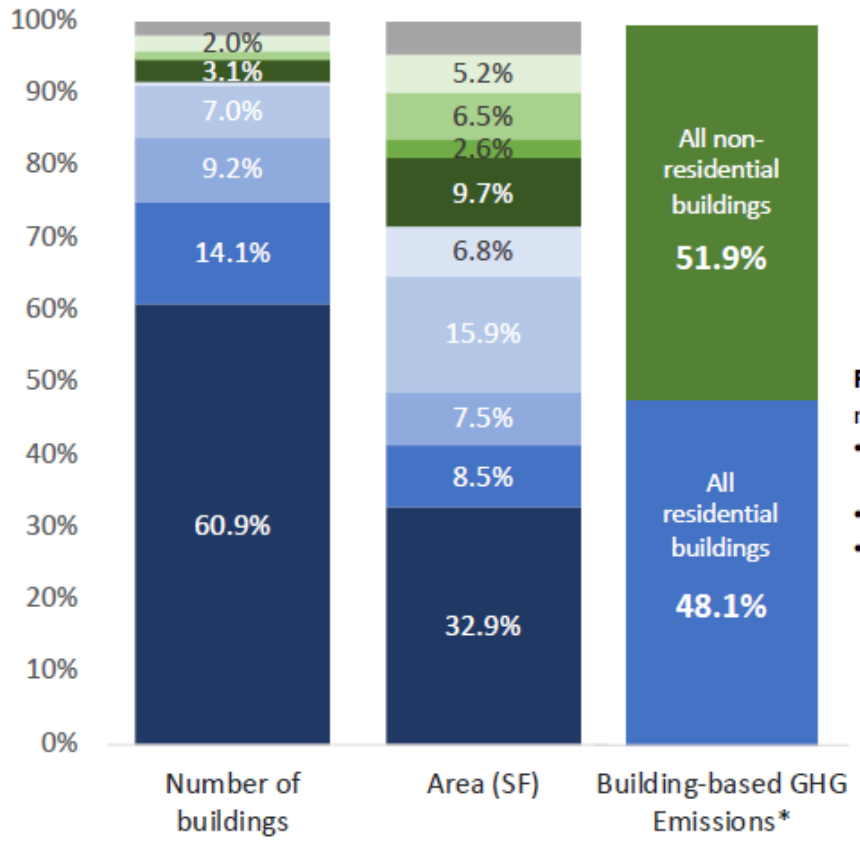
Building Typologies

Summary of Building Typologies

	Typologies	Number of Units	Number of Stories	Total buildings*	Total square feet
1	**Commercial, low rise**	Any	Up to 3	1,083	8,279,496
2	**Commercial, mid-high rise**	Any	4+	38	2,268,880
3	**Industrial**	Any	Any	426	5,567,934
4	**Institutional (non-residential)***	Any	Any	720	4,476,671
5	**Single family homes**	1	Up to 3	21,582	28,200,352
6	**Duplexes**	2	Up to 3	5,013	7,253,688
7	**3-4 family homes**	3-4	Up to 3	3,246	6,428,229
8	**5+ unit multifamily, low rise**	5+	Up to 3	2,476	13,620,735
9	**5+ unit multifamily, mid-high rise**	5+	4+	182	5,797,275
	Missing Data	n/a	n/a	666	3,794,381
TOTAL				**35,432**	**85,687,641**

*Notes: Institutional (non-residential) removes all buildings on the UC Berkeley campus. The total number of buildings may include multiple buildings that exist on a single lot.

Buildings by Count, Area, and GHG Emissions

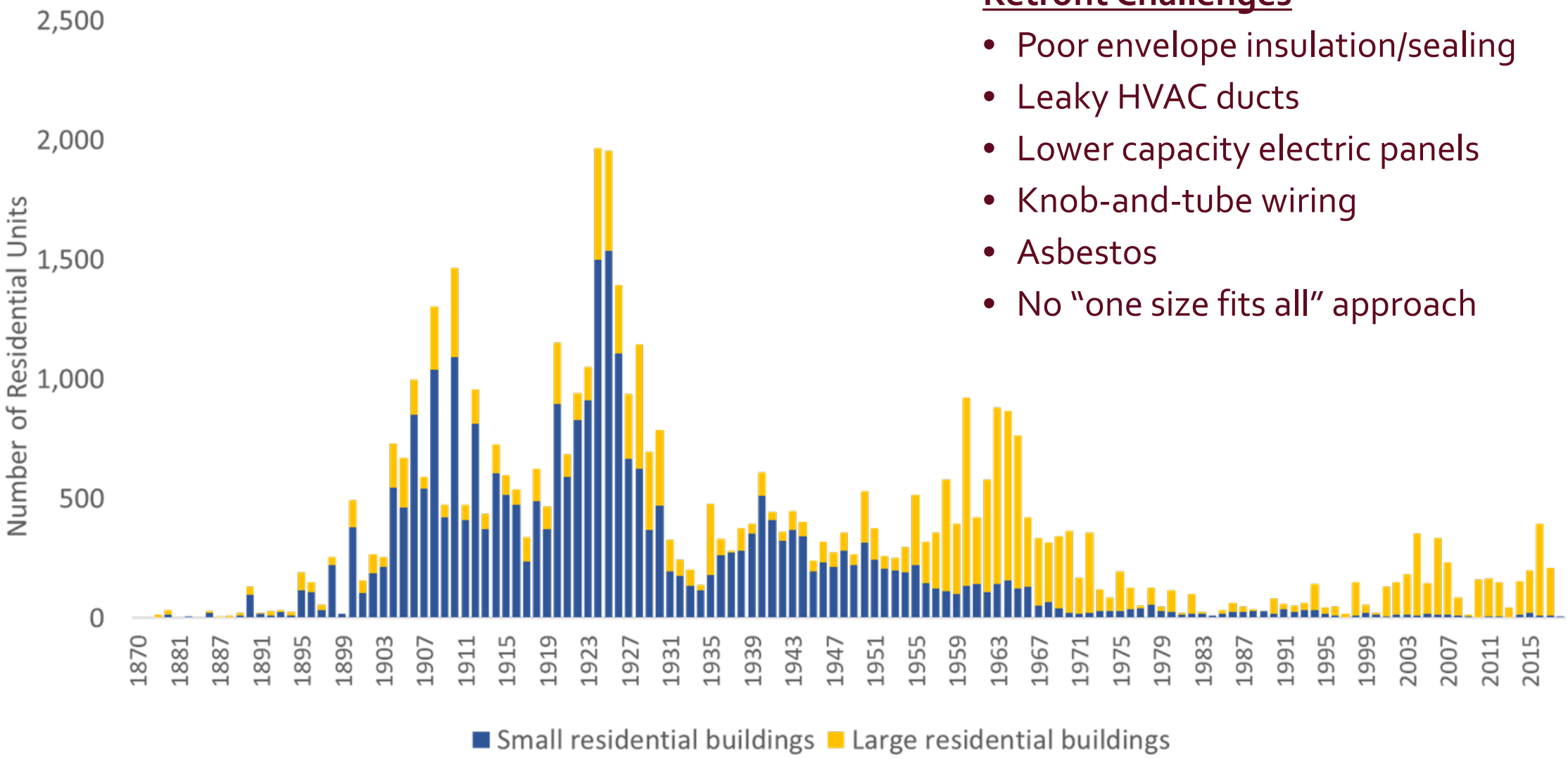


Non-residential buildings make up:
- 6% of total buildings
- 24% of built area
- 52% of building-based GHG emissions

Residential buildings make up:
- 92% of total buildings
- 72% of built area
- 48% of building-based GHG emissions

*Note: This likely over-estimates GHG emissions non-residential emissions (which includes emissions from BART) and under-estimates GHG emissions residential buildings.

Key Issues: Older Housing Stock



Retrofit Challenges

- Poor envelope insulation/sealing
- Leaky HVAC ducts
- Lower capacity electric panels
- Knob-and-tube wiring
- Asbestos
- No "one size fits all" approach

Source: Building Electrification Initiative

Modeled Cost Analysis

- **Goals**
  - Understand current economics of electrification
  - Identify early opportunities
  - Analyze cost impacts of various policies, incentives, and market interventions
- **Key Takeaways**
  - Rooftop solar improves financials – right now, for some
  - Envelope improvements (e.g. insulation) rarely pencil out, but bring resilience and other benefits
  - Longer paybacks in multifamily buildings
  - Equity implications

Berkeley Pathwanderers Association - Atlas Path

Variables in Multifamily Buildings

- No "one size fits all"
- Variable system types – central vs. individualized units
- Rent controlled vs. non-rent controlled
- Tenant pays utility bills vs. owner pays utility bills (gas and electric)
- More challenging to install solar + storage for individual units
- Modeling shows longer payback period and more challenging to have solar offset costs

Funding Multifamily Upgrades

How do we solve the split incentive problem?

- Must include renters
- Mandatory electrification could increase rents and lead to displacement
- No upgrades leads to sub-standard housing
- Holistic financing programs for electrification like Pay as You Save (PAYS)
- Tariffed on-bill financing may be a solution
- Tie electrification to Low-Income Weatherization Program
- Provide support to building owners and protections to tenants

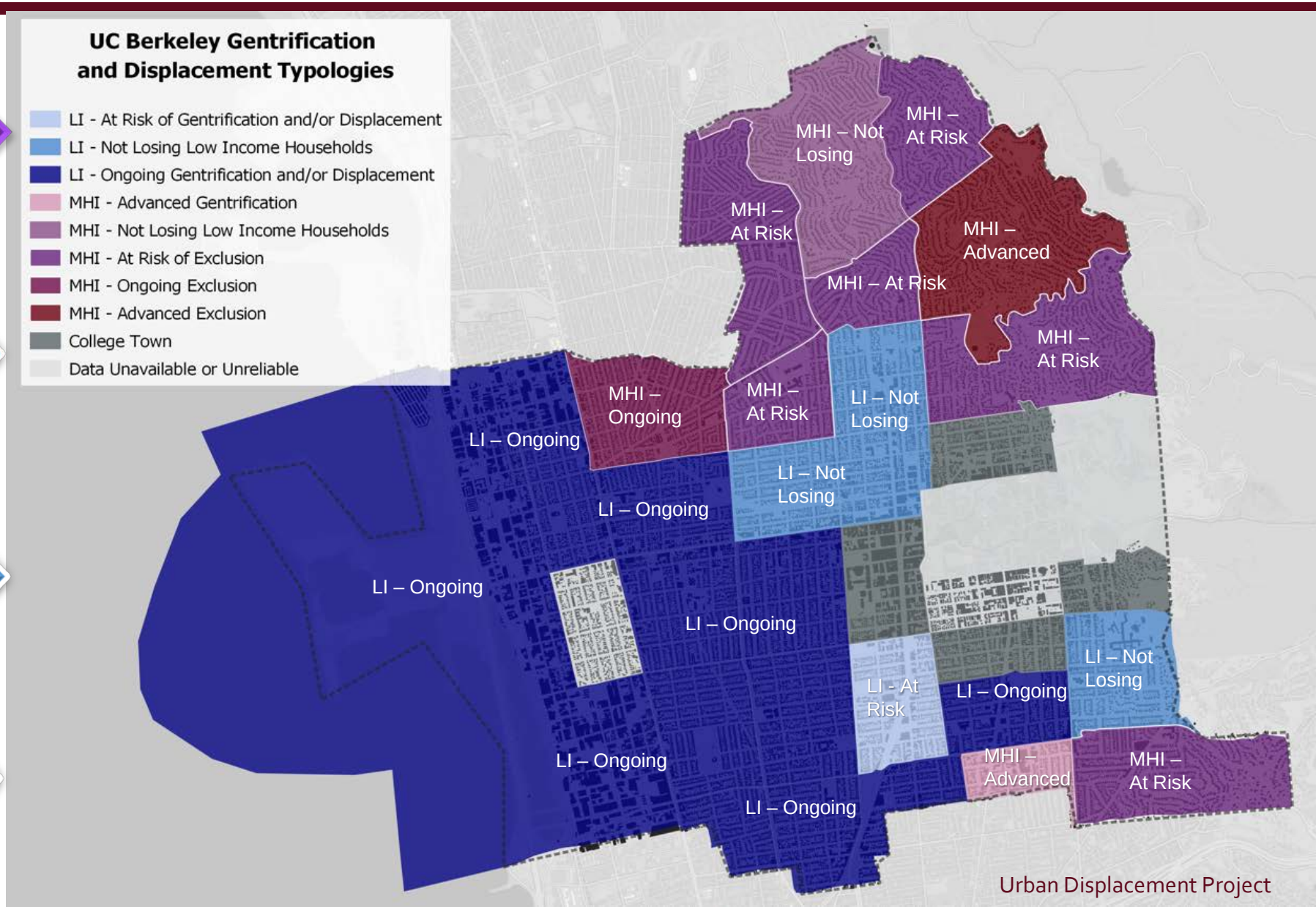
Ongoing Housing Crisis & Displacement Risk

Ongoing gentrification and displacement

Extreme rental rates (median $2600 in 2017)

Poor protections for unsubsidized affordable housing

Disincentives for retrofitting rent-controlled buildings



What We Heard:

Health, safety, comfort & resilience benefits of electrification should be accessible to all

Upfront and long-term costs are primary concern

Electrification upgrades should be linked with other health/safety upgrades (e.g. lead, asbestos, mold)

Concern of displacement due to housing improvements (increased rent)

Need accessible financing and funding options – no new debt

Need to work with labor for just transition

Work closely with community on solutions

More education needed

Need to build trust in City, electrification

City and companies should be a model in electrification before requiring others

Concern of reliability of electricity supply, especially with PSPS events

Community Feedback

Model Results

Electrification has more up-front costs than simply replacing with natural gas appliances.

Paybacks are longer due to mild climate and relatively high electricity costs.

Community Feedback

Costs were a significant hurdle for many community members.

While electrification could provide some real long-term benefits, there are serious equity impacts that must be acknowledged and mitigated.

Draft Equity Guardrails

ACCESS TO HEALTH & SAFETY BENEFITS

Ensure equitable access to marginalized communities and others most impacted by climate change, to health, safety and comfort benefits from electrification for both home owners and renters. Due to the upfront costs of electrification, many households will need financial support to have access to high quality upgrades and the benefits of electrification, including long-term cost savings.

ACCESS TO ECONOMIC BENEFITS

Ensure all community members, especially marginalized communities have equitable access to affordable funding and financing mechanisms, and to high-road job opportunities.

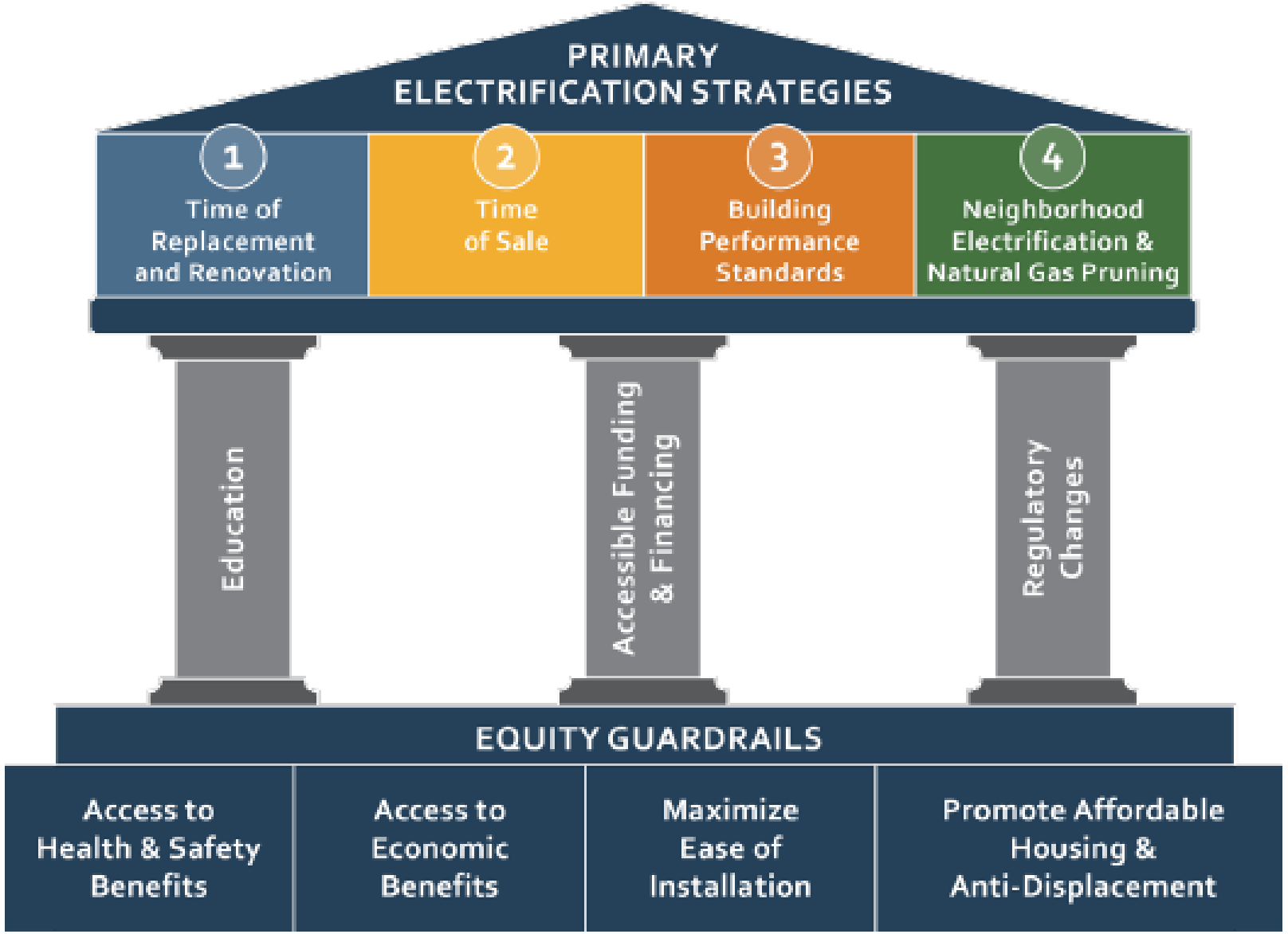
MAXIMIZE EASE OF INSTALLATION

Ensure that incentives and programs for the community provide meaningful support to renters, owners, and marginalized community members to provide a simple process that minimizes the burdens and impacts associated with the installation of high quality electric equipment installed by a fairly paid and well trained workforce

PROMOTE HOUSING AFFORDABILITY & ANTI-DISPLACEMENT

Ensure upgrades don't displace renters or over-burden homeowners. Programs should support housing production, housing preservation, and tenant protections.

Draft Strategy Overview



1. Time of Replacement and Renovation (TORR)

Incentivize/require equipment change at end of life, or when a major renovation is underway

Key considerations:

+ More cost effective (appliances already being replaced, construction upgrades already occurring)

+ Minimize disruption in service

- Can be piecemeal, losing opportunity for whole home electrification in the short term

2. Time of Sale

Incentivize/require equipment change when a building transfers ownership

Key Considerations

+ Berkeley's Building Emissions Savings Ordinance (BESO) amended to develop upgrade requirements

+ Improves value of building

+ Access to potential financing source (mortgage)

- Only covers small number of homes (4% sold per year)

- Increases already high home prices

3. Building Performance Standards

Establish building-level requirements such as GHG emissions per square foot that could include electrification measures by a specified date

Key Considerations

+ BESO has already been amended to set minimum standards over time

+ Provides flexible approach to improving building performance

- High upfront costs

- Requires tenant protections and funding/financing strategies to offset upfront costs

4. Neighborhood Electrification & Gas Pruning

Reduce and eventually eliminate use of gas infrastructure and simultaneously electrify

Key Considerations

+ Leverages efficiencies of scale

+ Avoids stranded assets

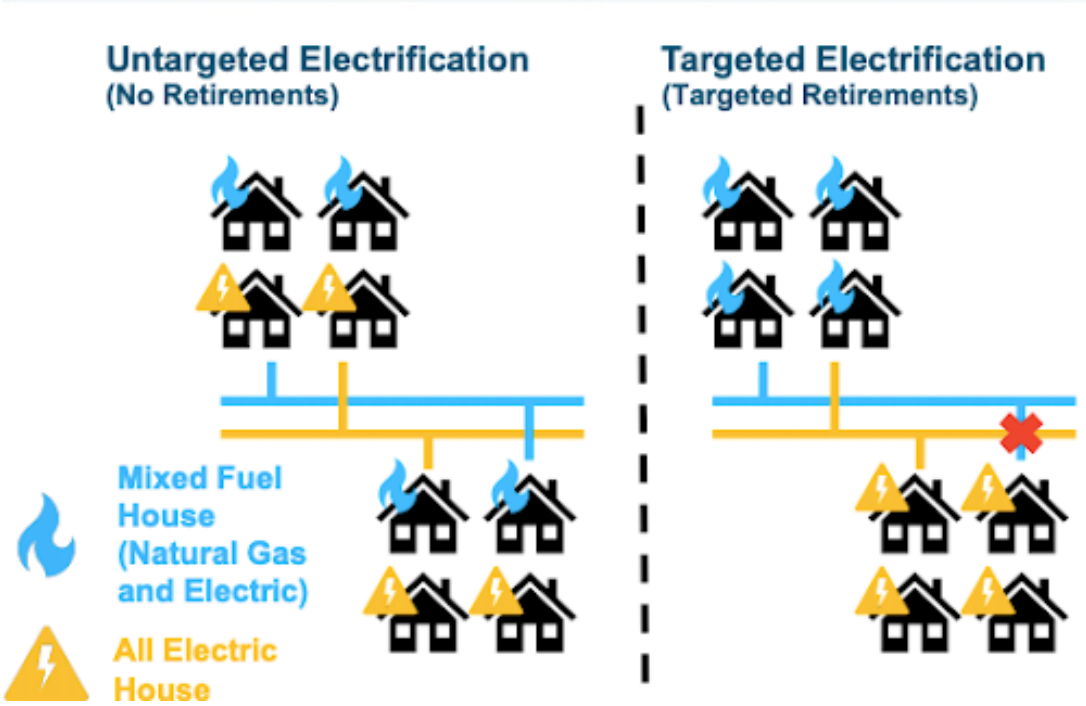
+ Opportunities for microgrids

+ Opportunity to focus on historically disinvested neighborhoods

+ Focus on one grid rather than two

- High up-front cost

- Challenge of finding locations that meets technical, financial, equity and community considerations



Source: E3-UCI Draft Results: Future of Natural Gas Distribution in California (slide 28)

Cross-Cutting Actions

Advance **Pillars** (education, accessible funding & financing, regulatory changes) and **Equity** Guardrails

- Contractor and community education
- Collaborate to advance funding and financing programs
- Collaborate to develop high road workforce and jobs
- Develop and advance solutions for tenant protections and affordable housing
- Collaborate with regional and state partners to support rate structure changes at the CPUC

Rising Sun Energy Center for Opportunity

Draft Phased-In Approach

Phase 1 (2021-2025)

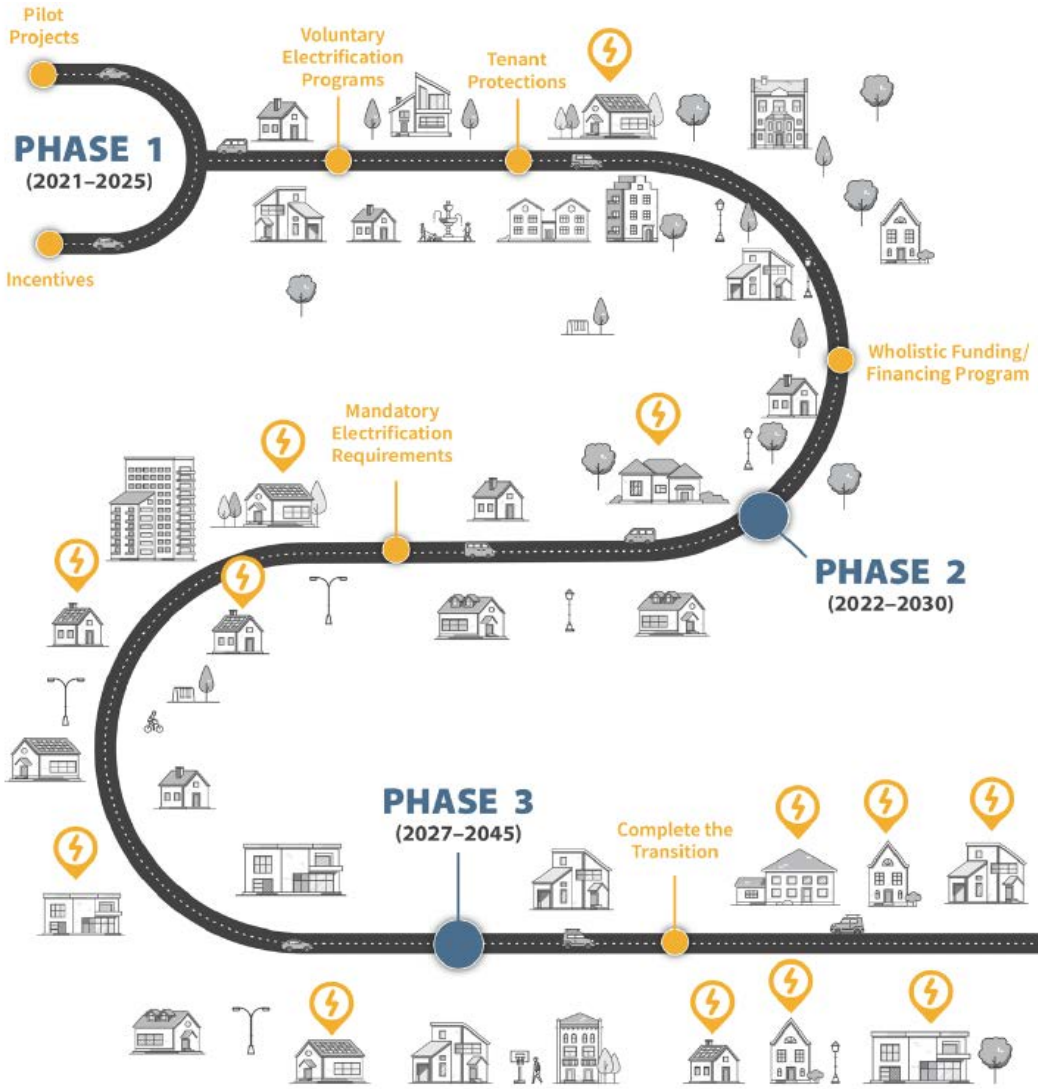
- Lay the groundwork, develop accessible and affordable solutions

Phase 2 (as soon as possible, no later than 2022-2030)

- Implement core policy levers

Phase 3 (as soon as possible, no later than 2027-2045)

- Complete the transition



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Next Steps

- Public Comment through May 15 on Draft Strategy: https://www.cityofberkeley.info/electrification/
- Finalize Writing Report – Summer 2021
- Final Report to Council – Fall 2021
- Implementation planning in partnership with community

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Discussion Questions

- What are specific opportunities for electrification in multifamily buildings?
- What are specific opportunities for electrification in rent-controlled buildings?
- What suggestions do you have for tenant protections?

Thank You!

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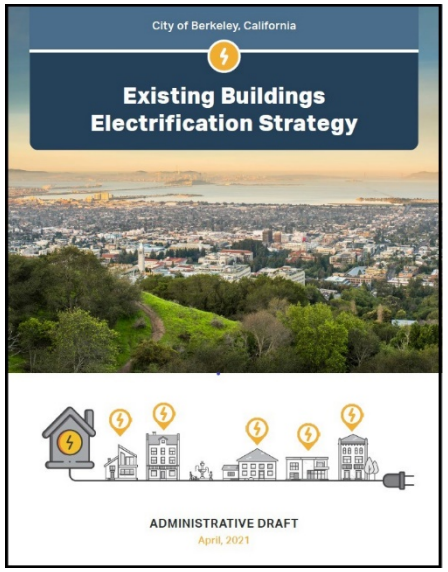

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