Driving Equitable Access to Energy Efficient, Zero Energy, and Zero Carbon Buildings in Underserved Communities

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Project Summary

Objective and Outcome

- Determine pathways to drive equitable and affordable access to energy efficiency, zero energy, and zero carbon building solutions in underserved communities
- Develop a methodology to define affordability in commercial buildings
- Engage with stakeholders from trusted, local buildings-focused organizations, minority focused developers, and utilities
- Deep dive into understanding current successes and systemic barriers that have limited equitable and affordable access to higher performing and healthier buildings

Team and Partners

NREL: Rois Langner, Shanti Pless, Dr. Ardelia Clarke, Tanushree Charan, Sika Gadzanku, Dr. Georgina Davis

University of Colorado, Boulder: Dr. Zahra Fallahi

Kevala: Margot Everett, Chuck Moran, Natalie Csinsi

4 Efforts

BOTTOM UP

TOP DOWN

01

Methodology to Define Affordability in Commercial Buildings and Understand its Impact on Underserved Communities

02

Work with Trusted, Local Organizations to Address Barriers that Impeded Access to Cost-Effective, Holistic, Building Performance Improvements

03

Support Minority-Focused Developer Incubator Programs for, and Within, Underserved Communities

04

Identify Overlapping Value Streams That Support Underserved Community and Utility Needs

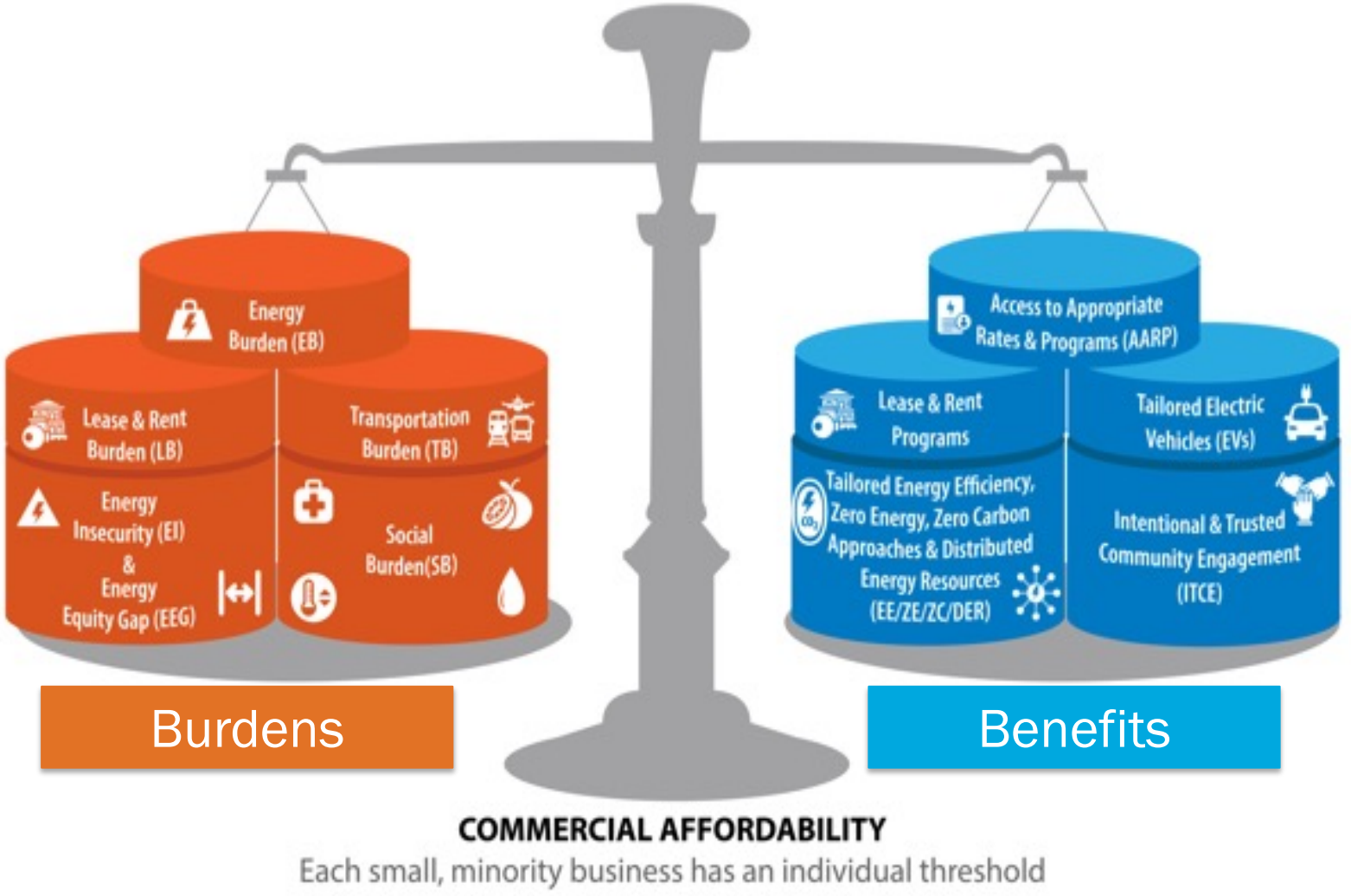
A Methodology for Defining Affordability in Commercial Buildings - *Problem*

"Energy-efficient heating, cooling, windows, lighting, and controls… more likely adopted in **newer, larger, more energy-intensive, owner-occupied buildings**… unlikely to diffuse rapidly to rest of commercial building stock."[1]

- **Energy is unaffordable**[2]
- **Current building energy- efficient solutions:**
  - High upfront costs
  - May require additional upgrades
- **Customers don't have the capital to invest in upgrades**
  - Small dollar credits[3]

[1] Andrews, Clinton, Krogman, Uta. 2009. "Explaining the adoption of energy-efficient technologies in U.S. commercial buildings". Energy and Buildings. 41. 3. 287-294. https://www.sciencedirect.com/science/article/pii/S0378778808002156
[2] https://www.aceee.org/sites/default/files/energy-affordability.pdf
[3] A Complex Portrait: An Examination of Small-Dollar Credit Consumers - https://www.fdic.gov/analysis/cfr/consumer/2012/a-complex-portrait.pdf

A Methodology for Defining Affordability in Commercial Buildings - *Approach*



- Extensive literature review
- Methodology developed based on tradeoffs between the burdens and benefits
- Applies an equity, energy, and environmental justice lens

Clarke, Ardelia. Defining Affordability in the Commercial Building Sector. 2023. NREL Technical Report, In-progress.

Work with Trusted, Local Organizations to Address Barriers – *Problem*

- **Fundamental gap between cultivated building energy efficiency resources and adoption of benefits in underserved communities**
- **Systemic barriers impeding local adoption are not well understood**
- **To advance equitable decarbonization in underserved communities, this gap is being investigated to:**
  - Improve access
  - Increase implementation of holistic building performance
  - Cultivate tailored resources

Work with Trusted, Local Organizations to Address Barriers – *Alignment & Impact*

Work with Trusted, Local Organizations to Address Barriers – *Approach*

- **Invited local non-profit organizations and community experts serving or within disadvantaged or underserved communities:**
  - One-on-one discussions
  - Roundtable discussion
- **Discussed:**
  - Mission
  - Barriers
  - Metrics for success
  - Near- and long-term needs
- **Cultivated tailored solutions addressing barriers and needs**

Work with Trusted, Local Organizations to Address Barriers – *Findings*

- Barriers
  - **Systemic**
    - *"I am not going to ask for things that I need because it might hurt me."*
  - **Climate, Health, Other**
    - *"How do we get the federal attention without people dying after a post-disaster scenario? We suffer from flooding and property damage everyday."*
- Needs
  - **Capacity and Workforce**
    - *"We often spend a lot of time clearing the air around confusing or complicated terminology like RECs. We wish we didn't have to spend this time unpacking all of it for our communities."*
  - **Financial**
    - *"In underserved communities, commercial buildings are mainly apartment complexes and small businesses…The tax-base are homeowners who have questions about how we are going to afford to adopt technology, what about broadband, etc."*

Work with Trusted, Local Organizations to Address Barriers – *Progress and Future Work*

- **Built trusted and intentional connections with individual organizations:**
  - Across 22 states,
  - 2 national-wide organization
  - 15 local non-profits, organizations
- **Continue virtual stakeholder roundtable discussions**
  - Analyzed qualitative data based on emerging 8 themes
- **Publish findings, validated by stakeholders**

Support Emerging Community Based Developer Incubator Programs for, and Within, Underserved Communities

Project Need:

Historically, there is **a lack of small community-based and diverse developers (but its recognized and emerging).**

- And therefore, a lack of small-scale development in the "missing middle."

The knowledge, tools, and support systems to successfully decarbonize projects focused on large scale development firms.

Small and emerging development firms are the ones who often **take risk** to innovate and demonstrate.

We're asking the first with the least resources to lead the way.

STRONG TOWNS

ARTICLES PODCASTS LEARN EVENTS ABOUT BECOME A MEMBER

Where Did All the Small Developers Go?

"**Missing middle**" describes a key physical consequence of the missing small-developer ecosystem.

Image via Sightline Institute's "Missing Middle Homes"

Support Emerging Community Based Developer Incubator Programs for, and Within, Underserved Communities

Project Goals:

- Emerging developers are at the forefront of innovation in building development and decarbonization.
- There are no specific resources or support eco-system focused on emerging decarbonization developers.
- **How can we develop, partner, support, and disseminate net zero carbon resources to this underserved developer stakeholder group?**

Support Emerging Community Based Developer Incubator Programs for, and Within, Underserved Communities

Stakeholder engagement with incubator programs that would be interested in creating developer-focused incubator programs.

Curated materials and resources to support small commercial developers.

- Provide examples of what successful innovation in emerging development looks like.
- Information on financing and incentives.

Address lack of support and resources for the emerging, small, community-based development stakeholders.

- Small development firms are the ones who take risks to innovate and move the broader industry forward.
- WE'RE ASKING THE FIRST WITH THE LEAST RESOURCES TO LEAD THE WAY.

Support Emerging Community Based Developer Incubator Programs for, and within, Underserved Communities

Alignment and Impact:

- Identified needed resources for emerging developers of affordable decarbonization
- Developed initial cohort of the leading emerging decarbonization developers
  - What innovation looks like and how successful emerging developers have overcome barriers

Arnold Development Group

- Largest Passive House in Kansas City
- 330,000 square feet, 276 units,
- Integrates low-cost and certain utility bills into rent
- Overall, first cost + rent competitive with typical apartments in city

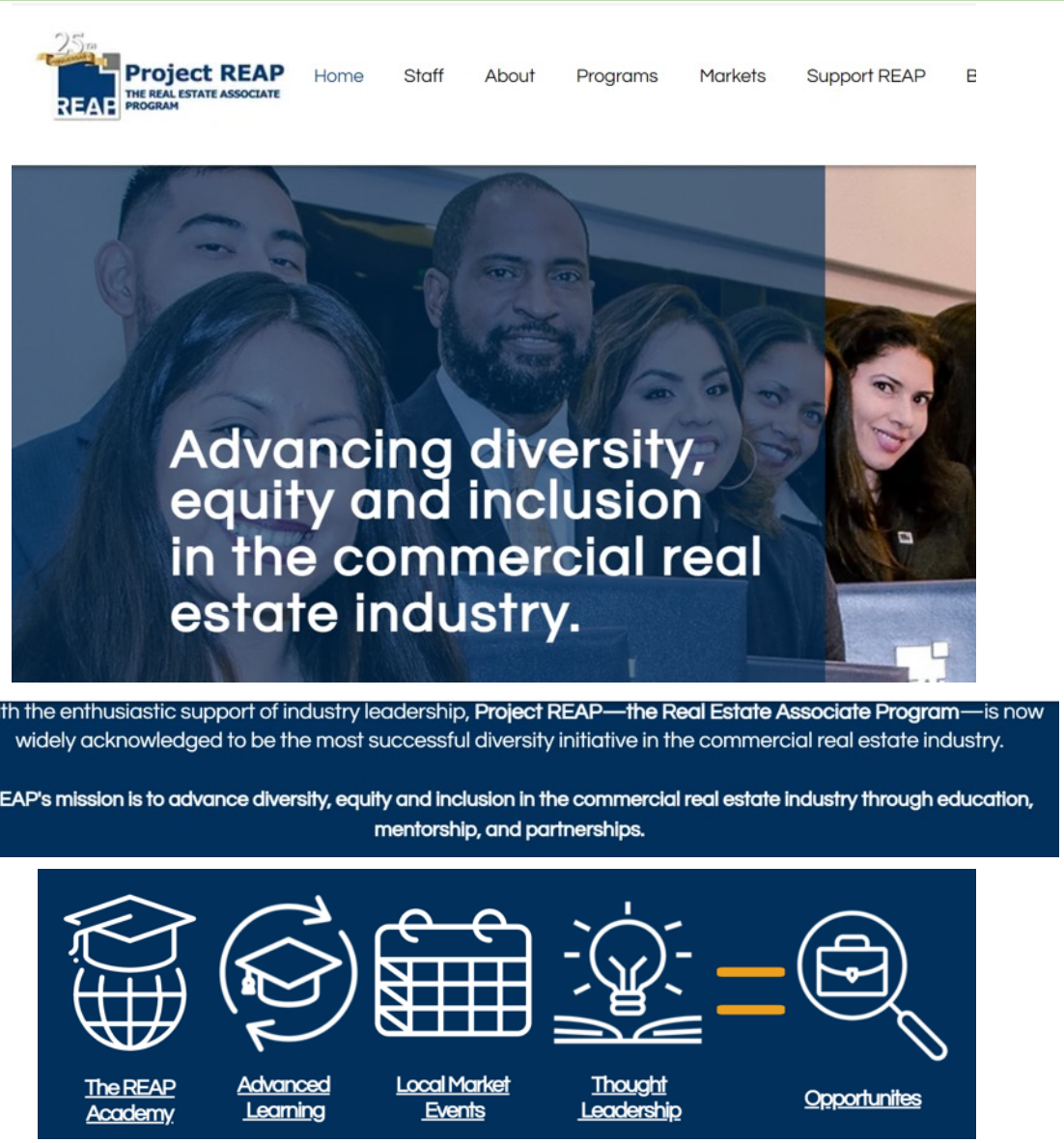
E6 Development

- First all-electric multifamily in Berkley
- Innovation in co-housing model to offer affordable housing options
- 50% on-site PV with batteries for demand management and backup power

Support Emerging Community Based Developer Incubator Programs for, and within, Underserved Communities

Future Work:

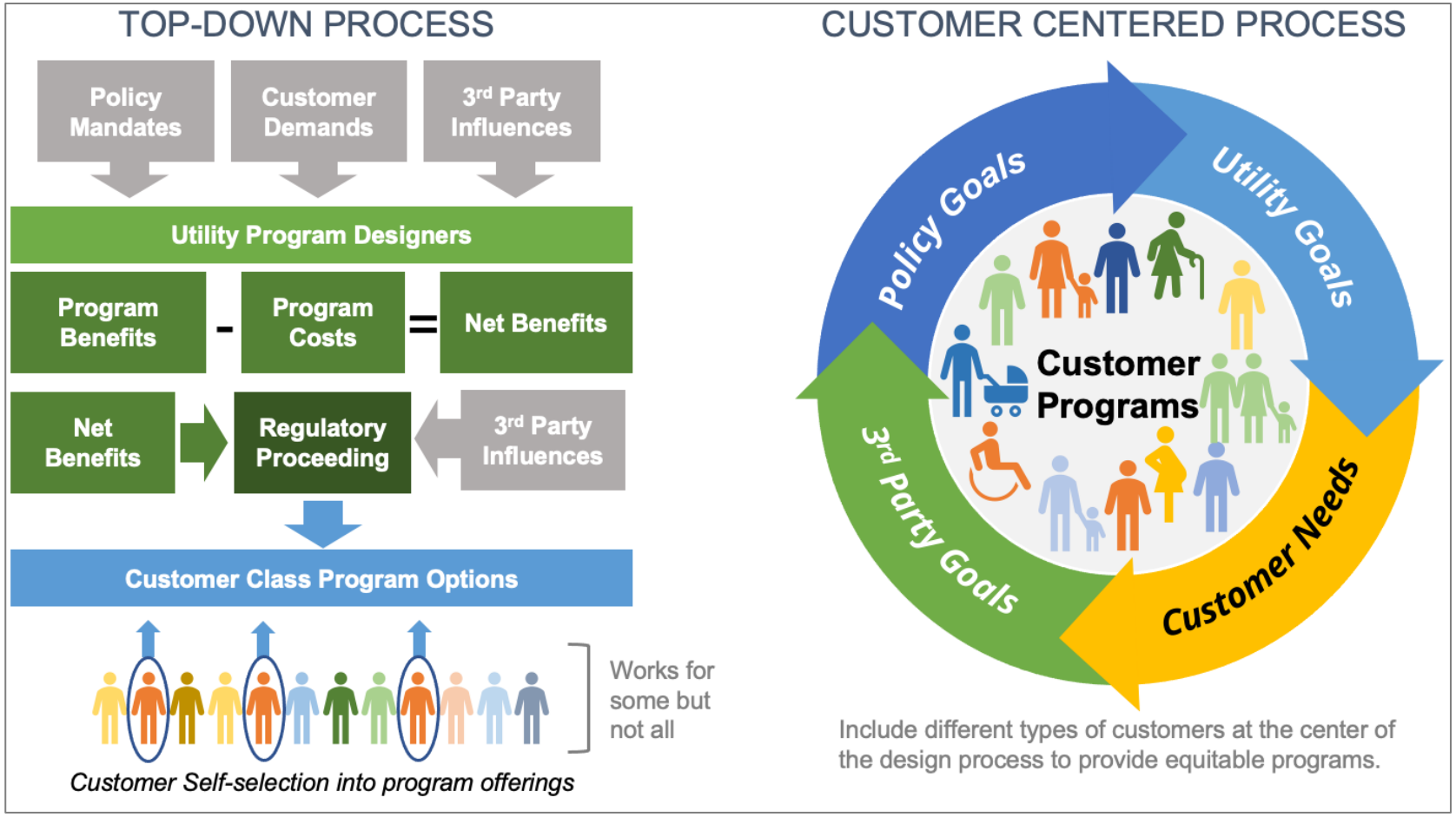
- Pilot emerging developer resources with Project REAP and CU Boulder Real Estate program
- Further develop decarbonization how-to resources specifically for small scale emerging developers
- ULI/ASHRAE Heat Pump Myths for Developers
- Stand up cohort of leaders and willing partners



Overlapping Value Streams: Utilities & Underserved Communities - *Project Overview*

Project Goals - Determine:

- Successful utility program characteristics and barriers
- Program attributes that enhance awareness, education, access, and affordability

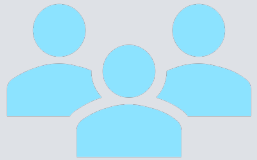


Overlapping Value Streams: Utilities & Underserved Communities - *Approach*

Through literature reviews and stakeholder interviews, gain insight on utility:

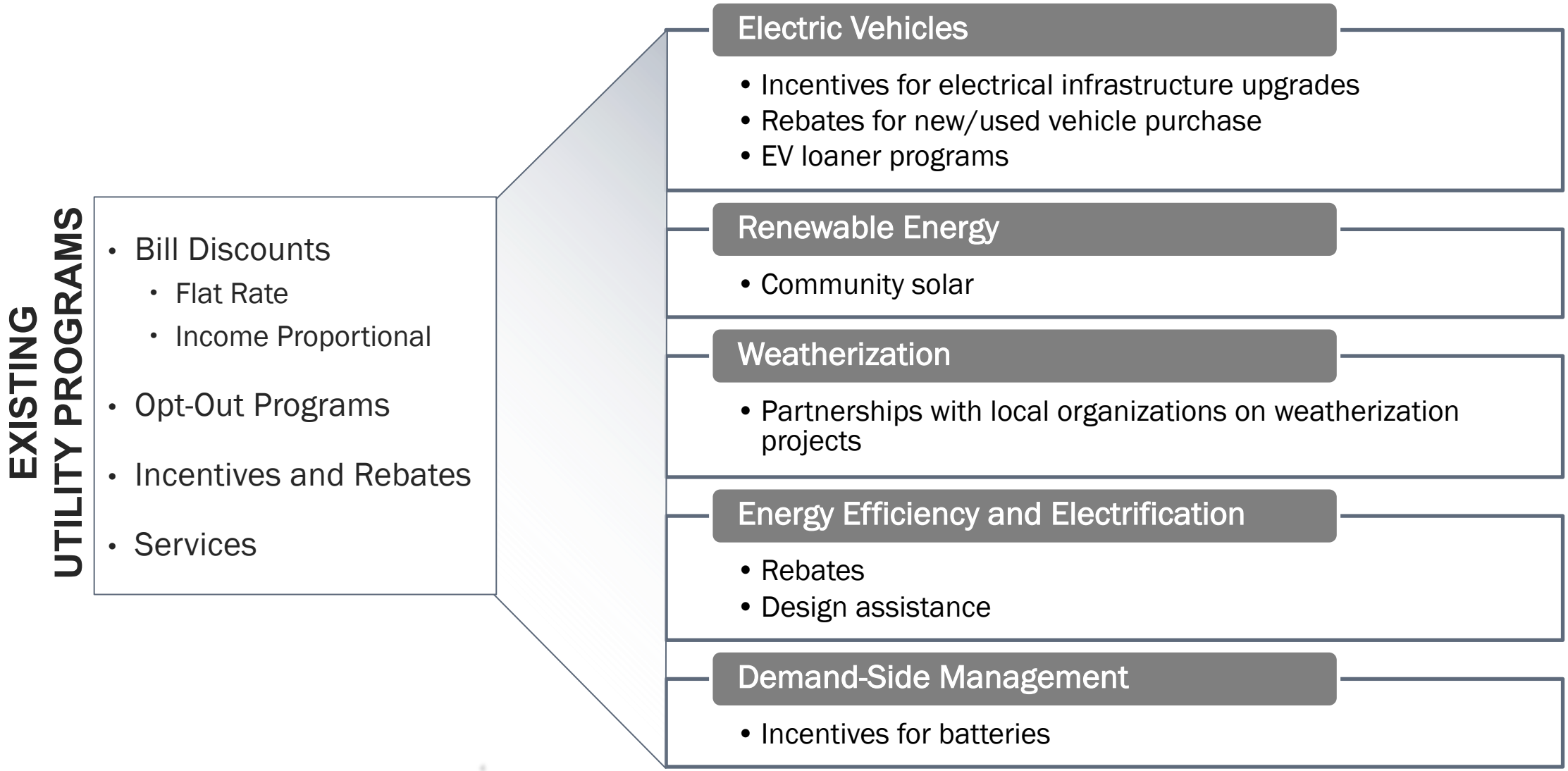
- Program motivation and design
- Approaches to identify community needs
- Processes for program outreach and enrollment
- Metrics to quantify program success
- Successes and barriers the programs experienced

Stakeholder Interviews



- 6 Investor-Owned Utilities
- 2 Municipal Utilities
- 2 Cooperatives
- 2 Community Choice Aggregators
- 1 Non-Profit Energy Buying Consortium
- 4 Customer Advocacy Groups

Overlapping Value Streams: Utilities & Underserved Communities - *Findings*



Overlapping Value Streams: Utilities & Underserved Communities - *Emerging Themes*

Top-Down Push Requires Innovation and Customer Participation

- More connection between decarbonization goals and equity
- Other stakeholders need to engage
- Customers need incentives to participate

Traditional Utility Program and Rate Design Processes Have Limitations

- Legislature driven vs. customer driven
- Regulatory process restrictions
- Utility bills should be transparent, equitable
- Alternative cost recovery approaches will be essential for the success of non-wires alternatives

Multiple Stakeholders are Necessary

- Working with trusted, local organizations is essential
- Representation matters
- How can larger commercial and industrial customers support disadvantaged communities

Metrics Are Needed

- Qualitative and quantitative metrics are needed

Overlapping Value Streams: Utilities & Underserved Communities - *Alignment, Impact, Future Work*

Alignment and Impact:

- Identifying overlapping value streams for utilities can help accelerate decarbonization efforts, equitably, and affordably
- More equitable, customer-centric utility programs and rates can support:
  - Increased building energy efficiency
  - Building electrification
  - Demand flexibility
  - Resiliency
  - Affordability

Future Work:

- Publish research paper
- Work with multiple utilities to:
  - Help design a pilot program
  - Analyze program potential
  - Develop metrics to evaluate the success and impact of the program
  - Develop case studies and impactful dissemination pathways

GUIDED DISCUSSION

GUIDED DISCUSSION

Can electrification and decarbonization drive affordability?

GUIDED DISCUSSION

Several barriers and needs have been identified that limit equitable access to building improvements and energy efficiency upgrades is underserved communities. What are we missing?

Barriers

- Infrastructural: Pre-weatherization condition of buildings; deferred maintenance
- Financial: Upfront capital requirements, skepticism, financial precarity, low priority for building upgrades
- Systemic: Economic disinvestment, disproportionate burdens, insufficient tax bases
- Policy: Permitting processes, split incentives, misalignment
- Capacity and Workforce: Insufficient staff capacity, lack of specialized technology expertise
- Climate, Health, and Other: Lack of data, chronic vulnerabilities

Needs

- Infrastructural: Minority-owned contractors
- Financial and Policy: Prioritized and sustainable federal and state funding and tools for disadvantaged communities
- Resources: Fact sheets, comic book strips, decision-support
- Capacity and Workforce: EJ institutes, training, utility connections
- Climate, Health, and Other: comprehensive and accessible data

GUIDED DISCUSSION

If we are going to accelerate decarbonization, especially in underserved communities, multiple stakeholders are needed to make it happen.

What other important stakeholders should we be working with? What strategies empower an intentional and trusted collaboration?

GUIDED DISCUSSION

In this project context, what types of efforts are most needed to drive more impactful, equitable change?

Who should lead these efforts?

GUIDED DISCUSSION

What decarbonization resources do emerging developers need the most?

Access to capital?

Risk of investment?

Navigating utility partnerships?

Making the economic case for decarbonization?

How to “speak all the languages” across project delivery?

GUIDED DISCUSSION

What decarbonization innovations have been piloted from emerging community-based developers?

(financing, business models, technology approaches, or developments)

Thank You

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