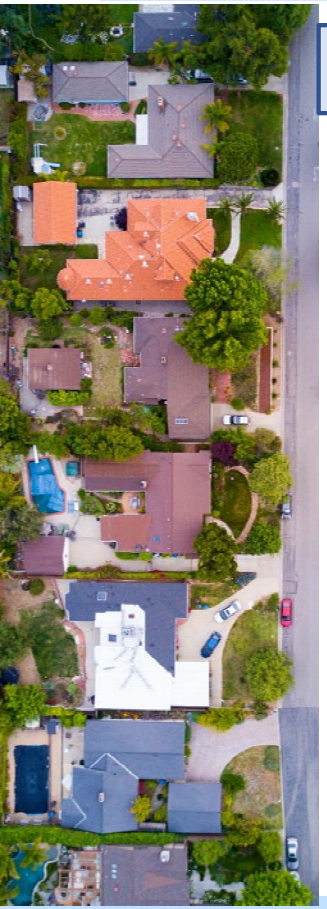
BUILDING ELECTRIFICATION ACCELERATOR

ZONING FOCUS GROUP

OCTOBER 20, 2020

Today's Agenda



1. Introduction (5 minutes)
2. Green Zoning and Electrification with NEEP (15 minutes)
3. Community Examples (15 minutes)
   - Belmont – Tracy Marquis
   - Ipswich – Carolyn Britt
   - Somerville – Hannah Payne
4. Q&A (20 minutes)
5. Closing and next steps (5 minutes)

Objectives for this meeting

1. Get an overview of green zoning and a general understanding of NEEP's technical assistance capabilities
2. Learn about initiatives in Belmont, Ipswich, and Somerville
3. Ask and answer questions and learn about available resources

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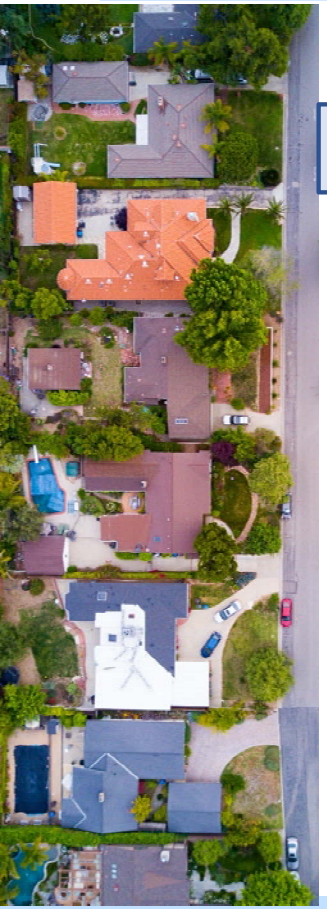

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NEEP

Kai Palmer-Dunning
Buildings and Community Solutions Associate
Northeast Energy Efficiency Partnerships Inc.

About NEEP

A Regional Energy Efficiency Organization

One of six REEOs funded in-part by U.S. DOE to support state and local efficiency policies and programs.

Northeast Energy Efficiency Partnerships

"Assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption 3% per year and carbon emissions 40% by 2030 (relative to 2001)"

Mission

We seek to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities.

Vision

We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work, and play.

Approach

Drive market transformation regionally by fostering collaboration and innovation, developing tools, and disseminating knowledge

Green Zoning: Using Local Zoning to Achieve Community Energy Efficiency and Resiliency

MA Stretch Code Background

Background

- MA developed Stretch Code in 2009
- Compromise between municipalities and Board of Building Regulations and Standards (BBRS)
- Satisfies criteria of Green Communities Act for reducing life-cycle costs in New Construction
- Adopted by 284 of 351 MA municipalities (Aug. 2020)

Stretch Code Efficiency

- 2009 Stretch Code- 20% more efficient than ASHRAE 90.1 2007 (Commercial)/ HERS 65 (Residential)
- 2017 Stretch Code- 10% more efficient that ASHRAE 90.1 2013 (Commercial)/ HERS 55 (Residential)

Zoning as a Decarbonization Tool

Green Zoning & MA Zoning Act

Definition: Crafting zoning bylaw/ordinances that give communities the ability to emphasize investment in better, more energy efficient buildings.

MA Zoning Act:

- MGL Chapter 40A, Section 1A: "*ordinances and by-laws, adopted by cities and towns to regulate the use of land, buildings and structures to the full extent of the independent constitutional powers of cities and towns to protect the health, safety and general welfare of their present and future inhabitants.*"

- MGL Chapter 40A, Section 3: *"No zoning ordinance or by-law shall regulate or restrict the use of materials, or methods of construction of structures regulated by the state building code…"*

Any changes to municipal zoning for towns in MA is required to be reviewed by Attorney General's Office

Massachusetts State Building Code

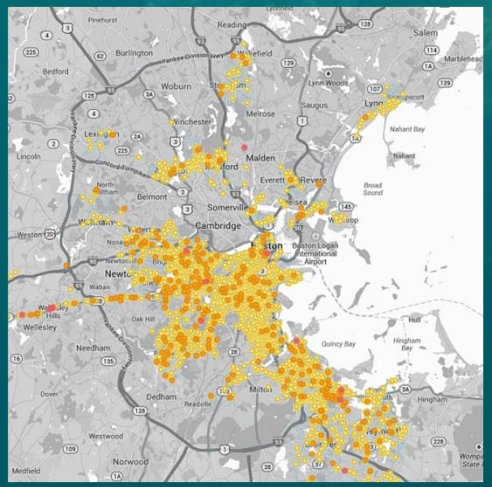
- Minimum standard promulgated by BBRS that preempts municipal ordinances relating to building standards
- "Beyond" minimum:
  - Stretch Code
  - Individual developers/property owners

Municipalities allowed to petition BBRS to impose stricter building standards based on "special conditions"

Role of Electrification

Electrification is a health and safety measure to limit impacts of fossil fuel emissions:

- Merrimack Valley Gas Explosion
- 32,877 gas leaks across Massachusetts in 2018
- Respiratory illnesses associated with poor air quality



Electrification promotes healthy buildings and local environment

- Shape intent of future local built environment

Incentive Zoning

Offer developers and building owners incentives to meet **specific building provisions:**

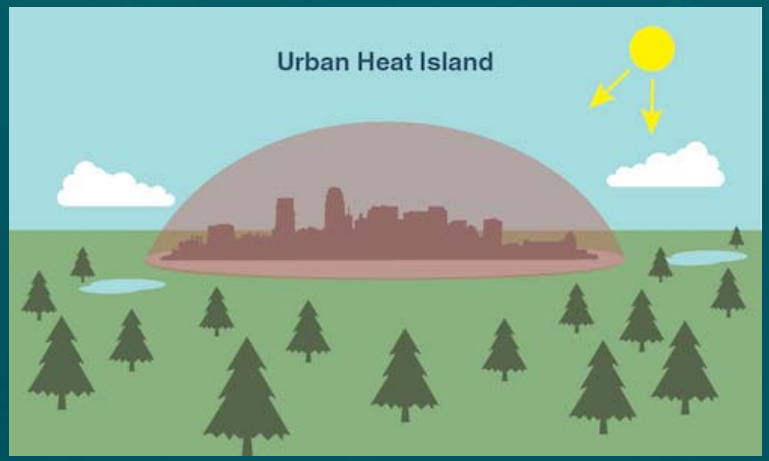
- Density Bonus: allows developers to build at higher floor to area (FAR)
- Expedited permitting process
- Waive on-site parking requirements
- Other zoning variances

Optional Provisions for Incentive Zoning

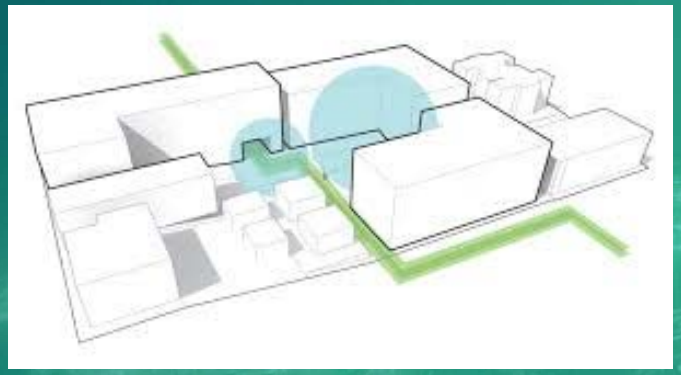
- Meet Performance standards (LEED, PHIUS, LBC, etc.)
- Electrification measures (no on-site combustion, heat pump or VRF minimum capacity)
- Embodied Carbon study and/or life-cycle analysis
- On/off-site renewable energy procurement
- Energy storage
- EV charging
- Electrification in affordable housing units

Other Green Zoning Strategies

- Overlay Districts:
  - Chapter 40R: SMART Growth
- Inclusionary zoning “in lieu of” payments
- Building score (landscaping)
  - Stormwater management
  - shading
  - limiting Heat island effect



Zoning Exemplars



Exemplar: Northampton

Urban Residential Sustainable Growth Overlay District:

- Buildings must meet one of two requirements:
  - HERS rating of 47 or lower : 1,200 sq. ft. or less
  - HERS rating of 41 or lower: larger than 1,200 sq. ft.

  OR
  - LEED Gold for new construction or LEED Gold in Neighborhood Development

Exemplar: Watertown

Solar Requirements (2018):

- Require projects of 10,000 sq. ft. or more or 10 or more residential units to include a solar energy system equivalent to 50% of the roof area
- 90% of uncovered area of parking structures
- Exemptions for a lack of a solar-zone or for load feasibility

Has not been challenged legally!

Recommendations

- Consider “Incentive Zoning” strategies
- Update zoning bylaw to reflect the intent of future zoning for decarbonization
- Petition BBRS to impose stricter buildings standards
- Seek outside legal counsel
- Be green zoning trailblazers!

Next Steps

NEEP has resources to offer:

- Individualized technical assistance
- Convene other technical and legal zoning experts
- Facilitate community working group on zoning

Upcoming Events

- November 17th, 2020: BBRS Public Hearing (submitting updated proposal of Energy Zero Stretch Code)

Reports/Resources

NEEP

- Green Zoning: Using Local Zoning To Achieve Community Energy Efficiency & Resiliency

Conservation Law Foundation

- The Massachusetts State Building Code & Climate Change: A legal primer and summary of convenings

Pioneer Valley Planning Commission

- Green Infrastructure In Zoning

For more information, contact:

kpdunning@neep.org

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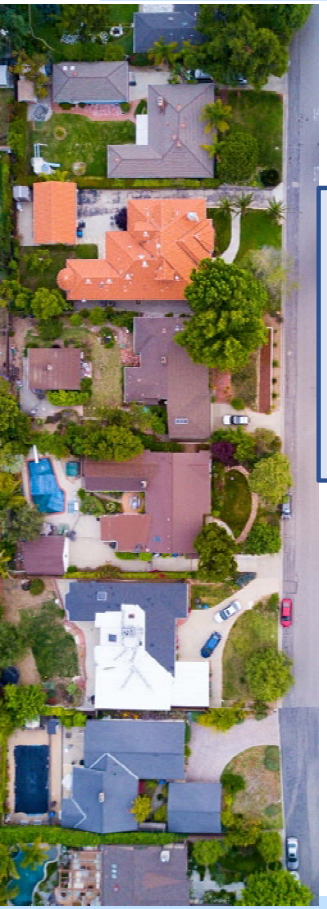

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Belmont

Tracy Marquis, AIA, LEED AP BD+C
Owner/Architect
Marquis Architecture

Ipswich

Carolyn Britt
350MA and Extinction Rebellion, an EnROADS Climate Ambassador, and retired municipal planner in Ipswich

Article 7

Energy Efficiency-related Zoning Changes

What this article does…

- Adds to “Purpose” in Zoning by-law to support Planning Board decisions to reduce energy consumption
- Allows existing buildings to adopt important conservation measures during retrofit – air source heat pumps and insulation applied to the exterior
- Defines an Ipswich Zero Energy Ready Building (electrified, solar ready, EV charging)
- Affects new construction in RRA,B, and C zones seeking a SP or waiver with density bonus in the column, Minimum Lot Area only– mostly OSPZ

Ipswich Zero Energy Ready Building

- A building that 1) has only high efficiency electric appliances and has no in-building combustion of fossil fuels for any purpose, including HVAC system operation, water heating, and cooking equipment, has a solar-ready roof with appropriate orientation to capture solar radiation and necessary wiring to inverter location, and 3) is wired for EV Level-2 charging

What this article doesn’t do….

- It does not prohibit wood burning in stoves or fireplaces (biofuels)
- It does not prohibit gas grills and propane generators that are operated outside the building

Why are These Important Changes?

- These provisions were in Recommendations of the Community Development Plan
- The ELD has a goal of lowering carbon-intensity in our mix of electricity sources through electrification and power purchase – now 56% carbon free and 23% renewable

How Are These Changes Beneficial to the Town and Residents?

- Improved indoor air quality
  - Burning fossil fuel indoors creates CO and other contaminants, which aggravate pulmonary conditions such as asthma and covid

- Electric heating and appliances produce less greenhouse gas emissions outside
  - Data from the Federal Energy Information Agency and from the Ipswich ELD show that for a 2500sf home, the **CO2 emissions from propane are about 5 times greater than for Ipswich ELD-supplied electricity**.

How Are These Changes Beneficial to the Town and Residents?

- Electric heating and appliances in new construction are generally **less expensive** than propane, both to install and to operate.

- A study by the RMI showed that, for Providence, RI, the **installation costs in new construction were less for heat pumps than propane**, and the energy costs less than half

- **For retrofits, the installation costs are more expensive for electric, but the electricity costs less than half that of propane.**

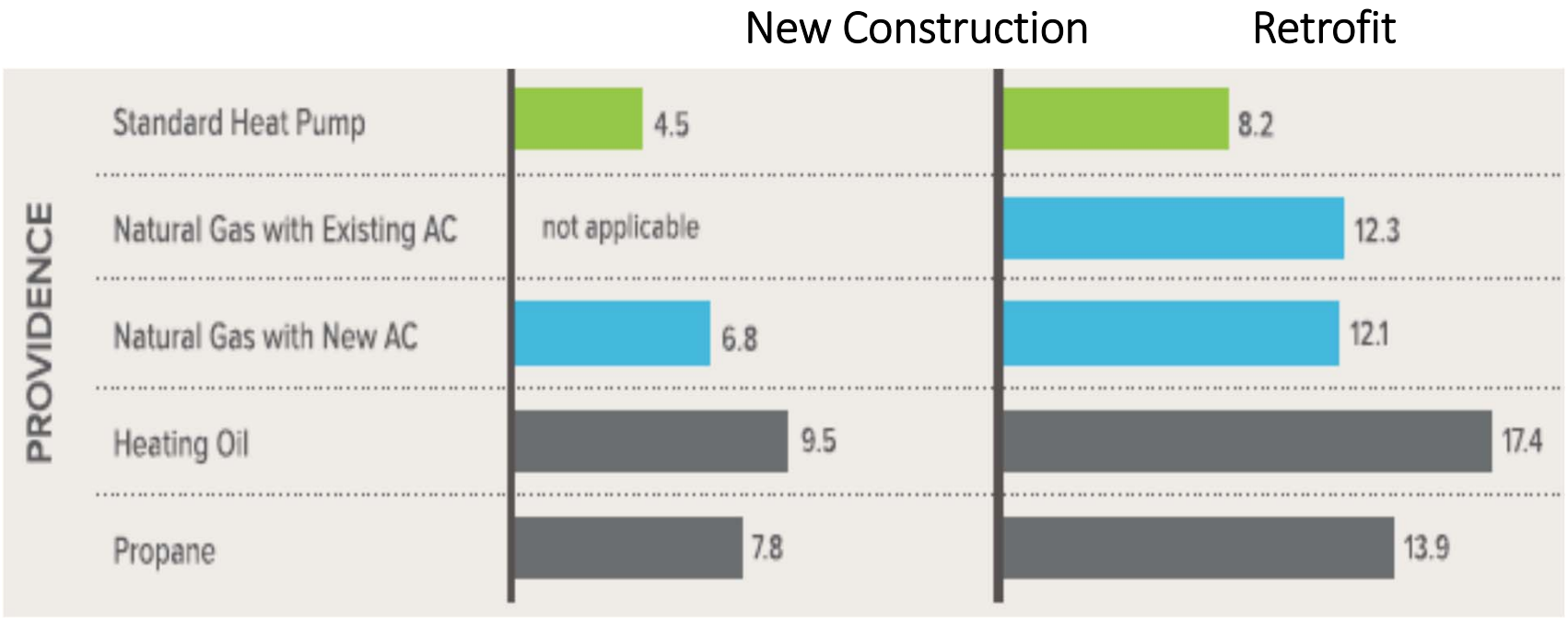
Other Benefits:

- **Consistent with the goals of the ELD,** which supports electrification through its rebate programs
- Leads to **sale of more electricity** to support departmental expenses and services
- Avoids concerns about the potential **explosive dangers of fossil fuels**, reduced public safety concerns
- **Reduces contribution to climate change** which is threatening our coast

- Required by the MA Global Warming Solutions Act and recent MA regulatory updates
  - Net Zero MA by 2050, with a reduction of carbon emissions below 1990 standards by at least 95%

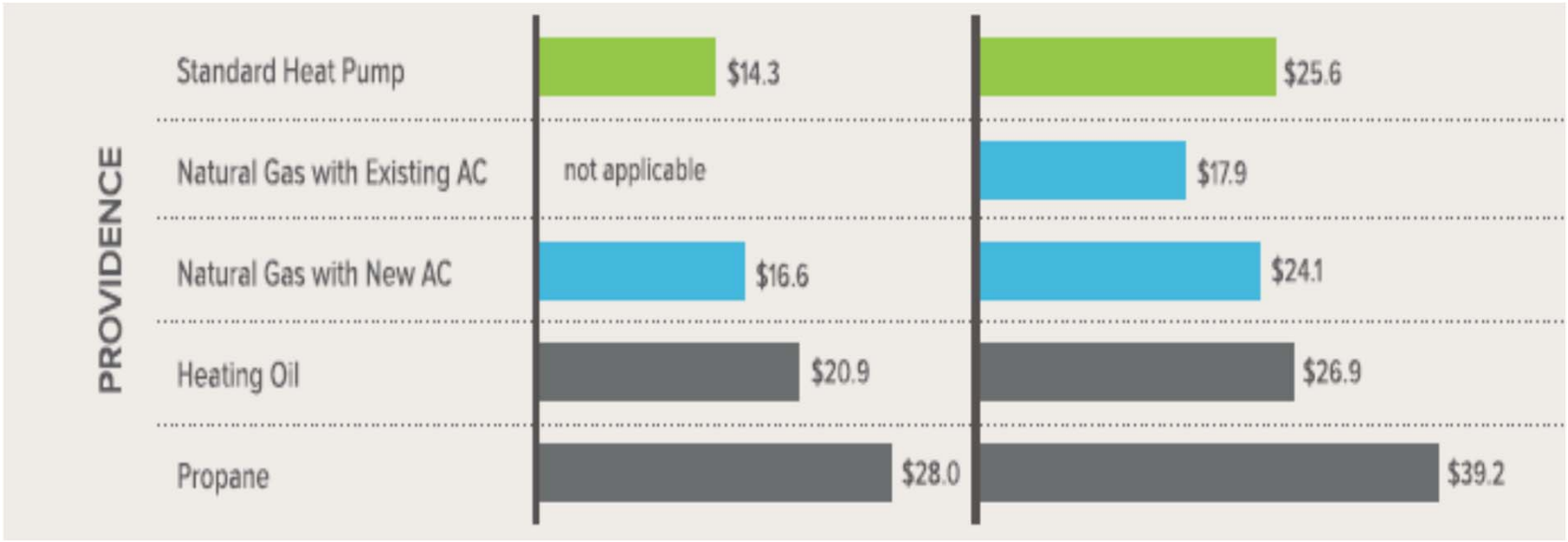
Annual Carbon Emissions by Scenario (thousands LB. CO2)

Source: Billimoria, Guccione, Henchen, and Louis-Prescott. The Economics of Electrifying buildings. Rocky Mountain Institute, 2018.



15 Year Net Present Cost of Water and Space Heating

Source: Billimoria, Guccione, Henchen, and Louis-Prescott. The Economics of Electrifying buildings. Rocky Mountain Institute, 2018.



RLPNC 17-14: Mini-Split Heat Pump Incremental cost Assessment. Final Report. NMR Group, Inc. November 27, 2018. Submitted to The Massachusetts Electric and Gas Program Administrators

Initial and Operating Cost Summary for Traditional and Mini-Split Houses

Equipment and Installation COST	Traditional House	Mini-Split House	Difference	Mini as % of Traditional
HVAC	$9,212	$10,798	$1,586	117%
DHW	$2,512	$1,680	-$832	67%
Total	$11,724	$12,478	$754	106%
Operating Cost				
Heating	$1,252	$1,737	$485	139%
Cooling	$132	$124	-$8	94%
Water Heating	$127	$146	$19	115%
Total	$1,511	$2,007	$496	133%
Total Adjusted to Ipswich prices (est.)	$1,662	$1,537	-$125	92%

Note: Traditional house served by “natural” gas. In rural zones in Ipswich predominant source of energy is propane. “Natural gas” predominates where service is available in-town.

Based on $.2063/kWh and $1.50/therm.
Ipswich rates = $.158/kWh and $1.65/therm
Local rates will minimize differences but data not available.
Both homes built to Stretch Energy Code requirements
Mini-split house has a ducted system

Somerville

Hannah Payne
Climate Change Program Manager
City of Somerville

ZONING IN SOMERVILLE

Hannah Payne

Climate Change Program Manager

City of Somerville Office of Sustainability and Environment

October 20, 2020

NET ZERO READY

Passive House or Zero Carbon from International Living Future Institute and no fossil fuel combustion for HVAC or cooking (except commercial kitchens and hot water).

- **Citywide:** required in exchange for denser residential buildings
- **Development districts:** required in exchange for no height limitation in Master Planned Overlay District

LEED REQUIREMENT

Must submit:

- LEED checklist
- Narrative
- Signed affidavit by LEED accredited professional

- Buildings **over 25,000** square feet must be LEED Gold certifiable
- Buildings **over 50,000** square ft must be LEED Platinum certifiable.

CONSIDERATIONS

- Implementation effort and staff capacity
- What type and level of development pressure does your community expect?
- What is reasonable trade-off?
- What standard(s) is appropriate for your community?

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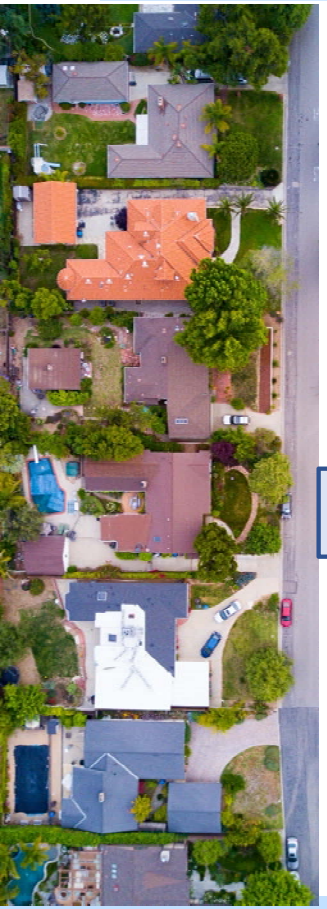

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Q&A

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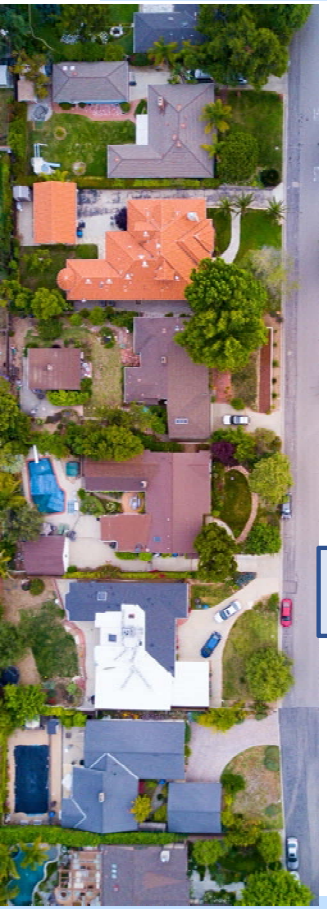

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Resources

- Potential support from NEEP (follow up with Kai)
- Teams discussions – several zoning resources and questions have been shared
- Resource library Zoning Folder has several reports and materials from various munis' zoning information. They are summarized in this spreadsheet in the Zoning Tab.
- Followup with other munis and coaches with additional questions