



# BUILDING ON THE STEP CODE: THE LOW CARBON BUILDING POLICY TOOLKIT

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# TEAM



**Devon Miller**  
Origin Sustainable  
Design + Planning



**Brendan McEwen**  
Dunsky Energy + Climate  
Advisors

Toolkit funded by:





# TOOLKIT OVERVIEW



# PURPOSE + FRAMING

## Purpose

- to provide guidance to BC local governments seeking to make the changes necessary to their policies, bylaws and guidelines to support low carbon buildings in their communities.

## Framing:

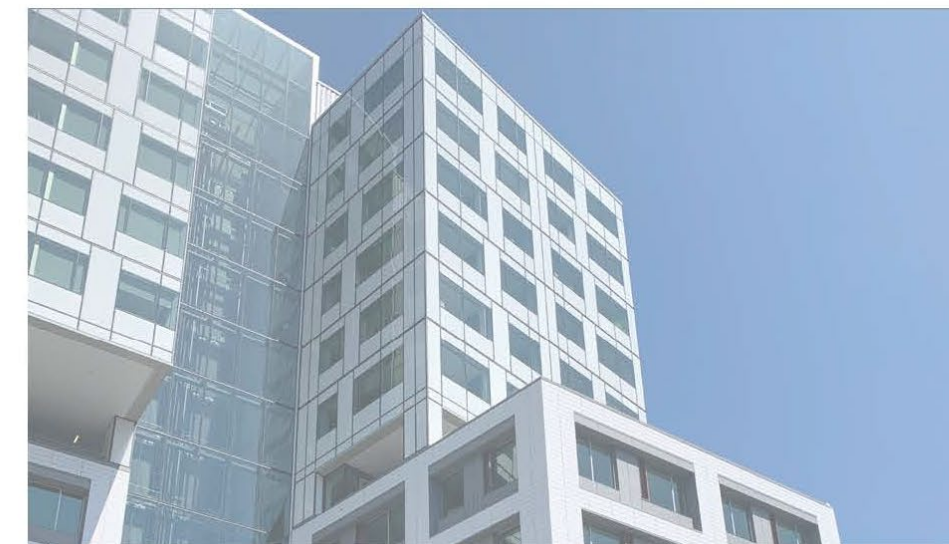
- Focused on **technologies + strategies** that are critical to reduce GHGs in the building sector
- How best to create **Step Code & Low Carbon Building friendly** policies, design guidelines & processes

## Target Audience

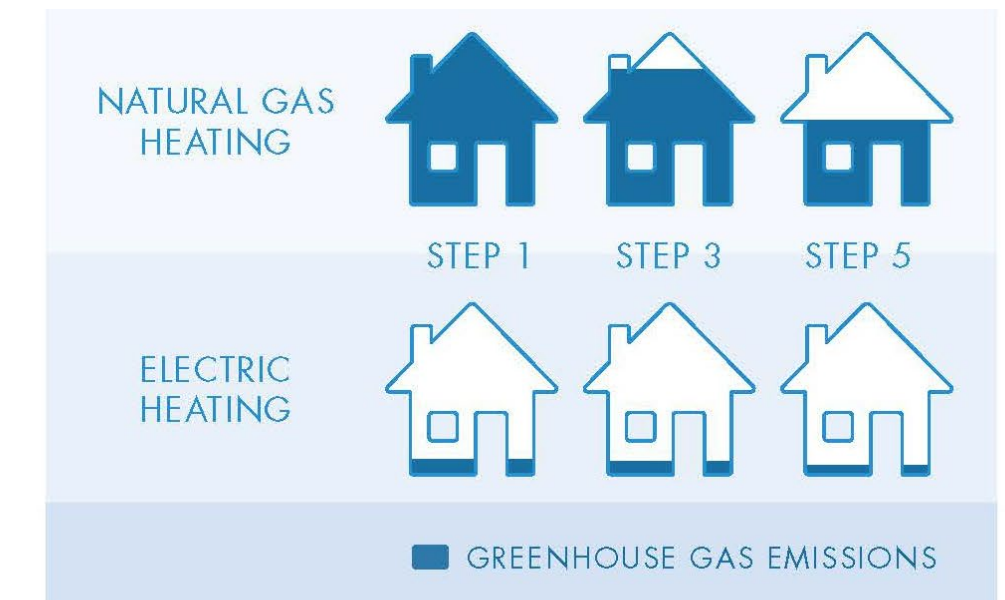
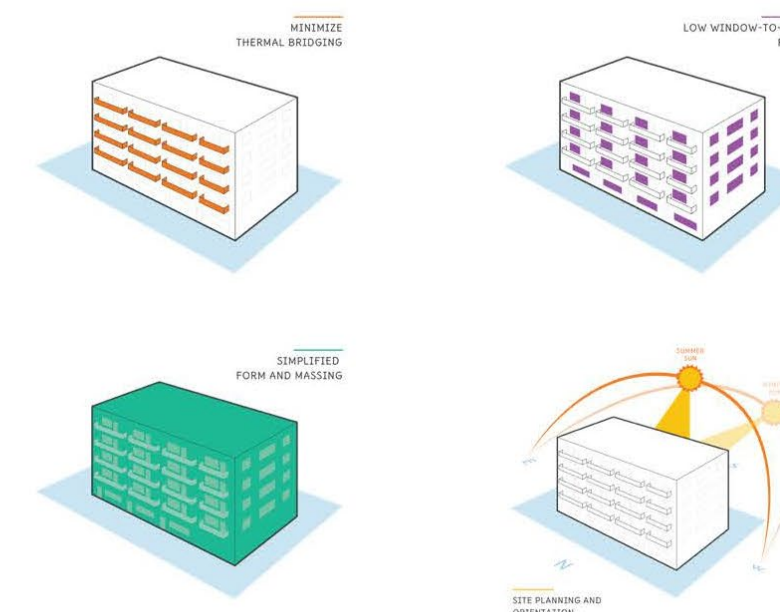
- Local Government staff

### TECHNOLOGIES + STRATEGIES THAT ARE CRITICAL TO REDUCE GHGS IN THE BUILDING SECTOR

#### ENERGY EFFICIENT BUILDING FORM



#### HEAT PUMPS



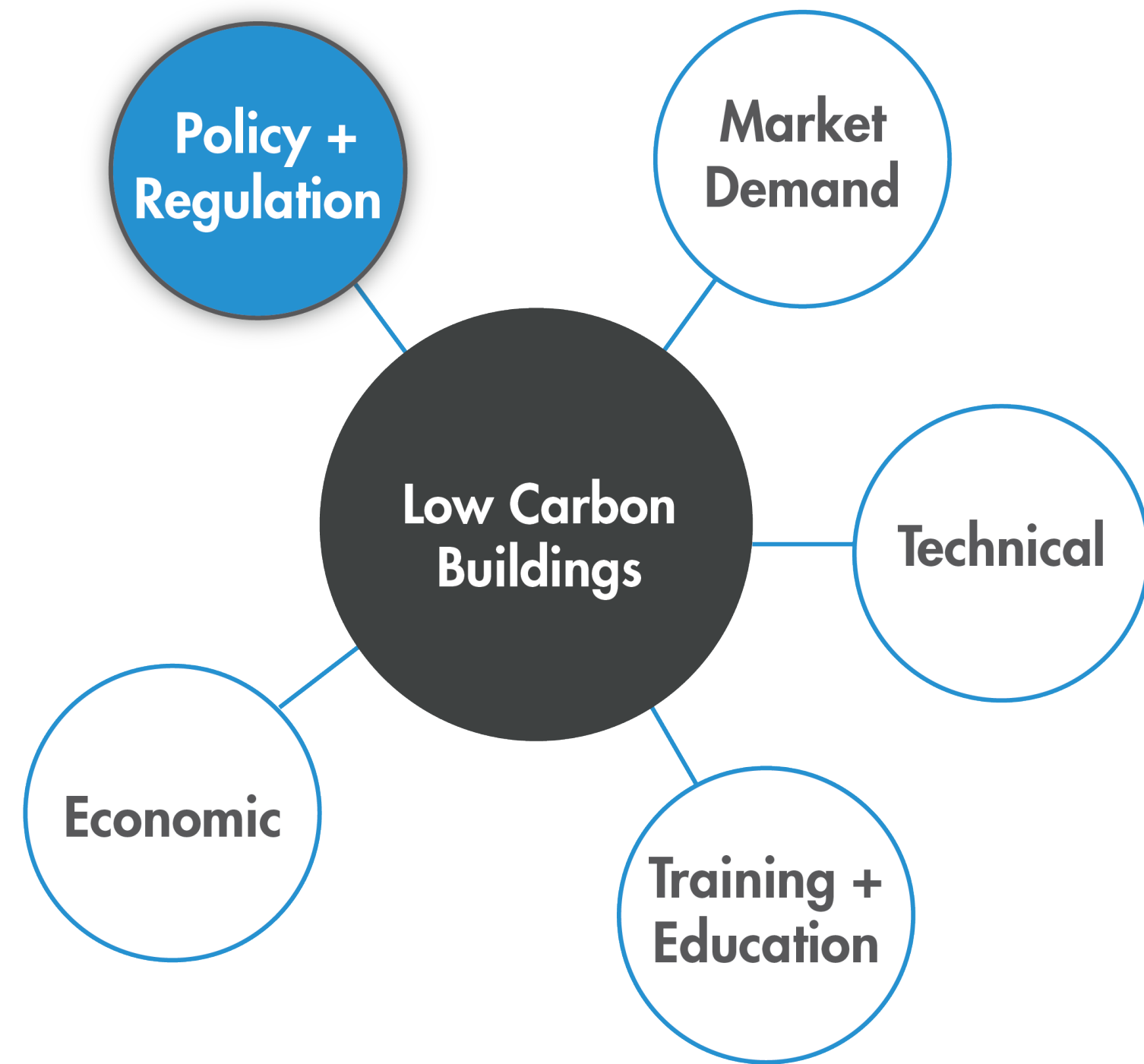
Adapted from Metro Vancouver original. Data source: BC Housing and the Energy Step Code Council 2018 report.





# SCOPE

## Addressing policy barriers...



BARRIERS TO MARKET TRANSFORMATION

## ...for large and small buildings

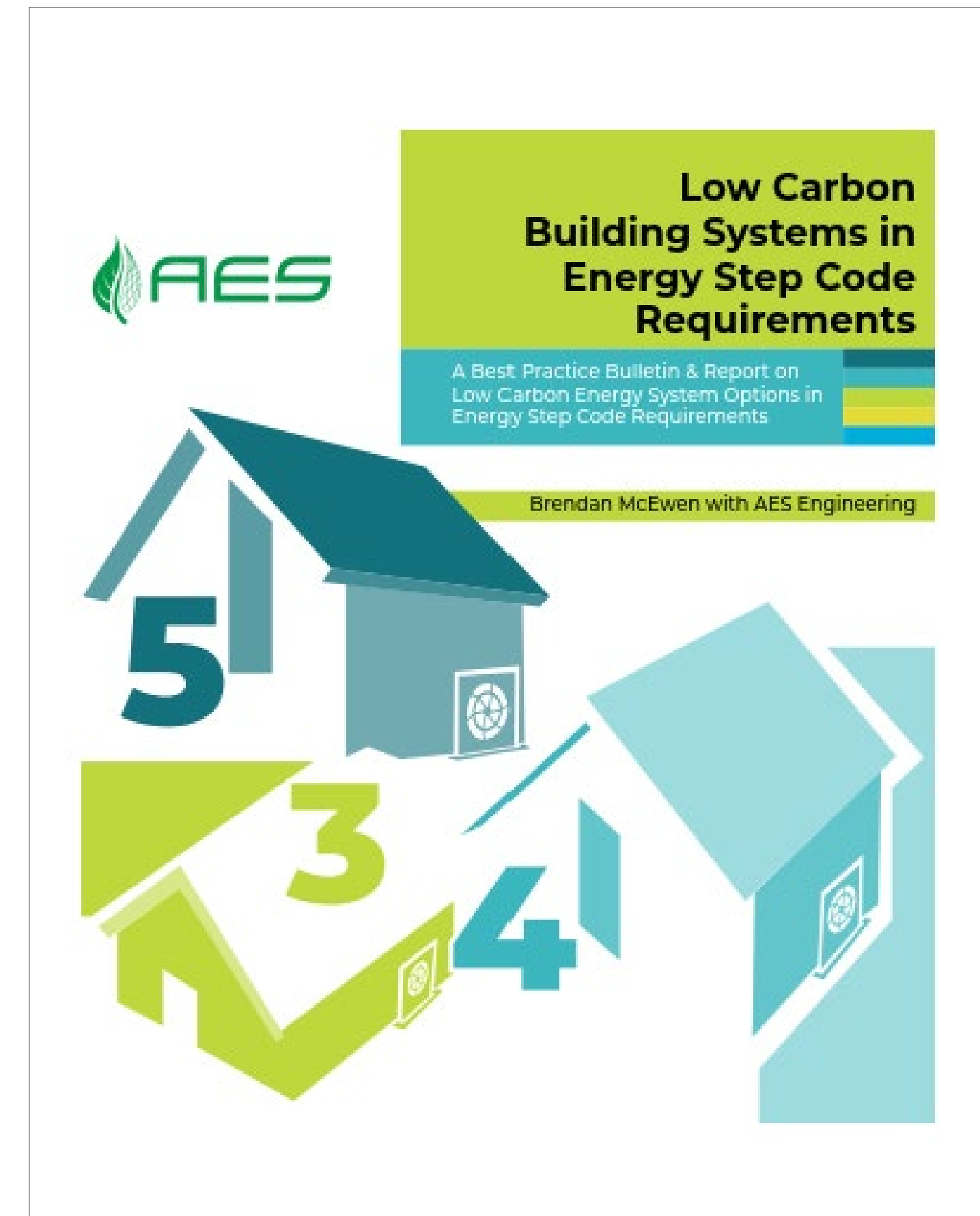


HEAT PUMP FOCUS



# SCOPE

- Focus is on **eliminating policy barriers** to low carbon building systems
- Focus is **not proactive incentives or requirements** for low carbon building systems, such as
  - Energy Step Code requirements
  - Low carbon incentives / requirements
  - See the recent report “Low Carbon Building Systems in Energy Step Code Requirements”

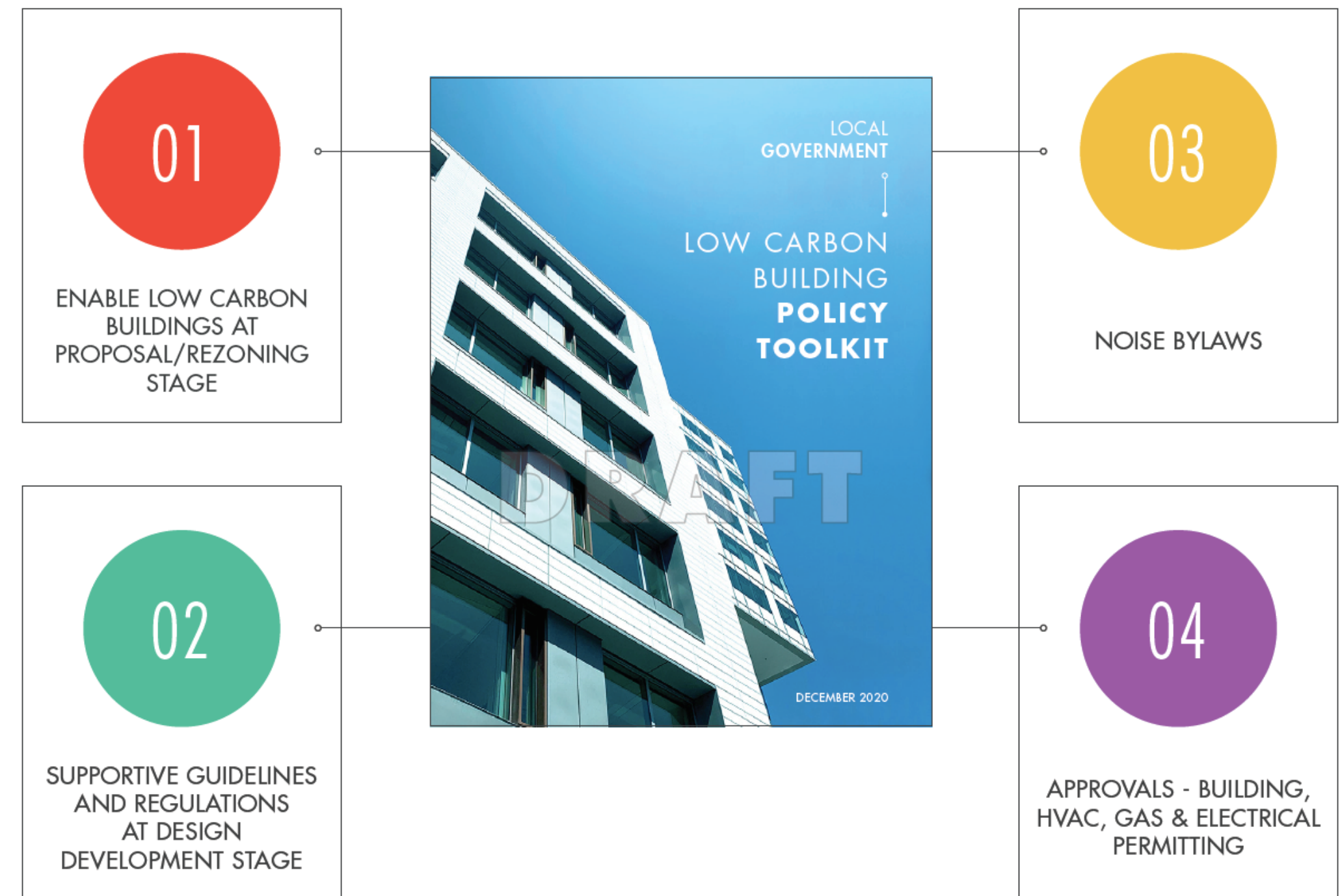




# STRUCTURE & ORGANIZATION

## Organized by Approvals Phase

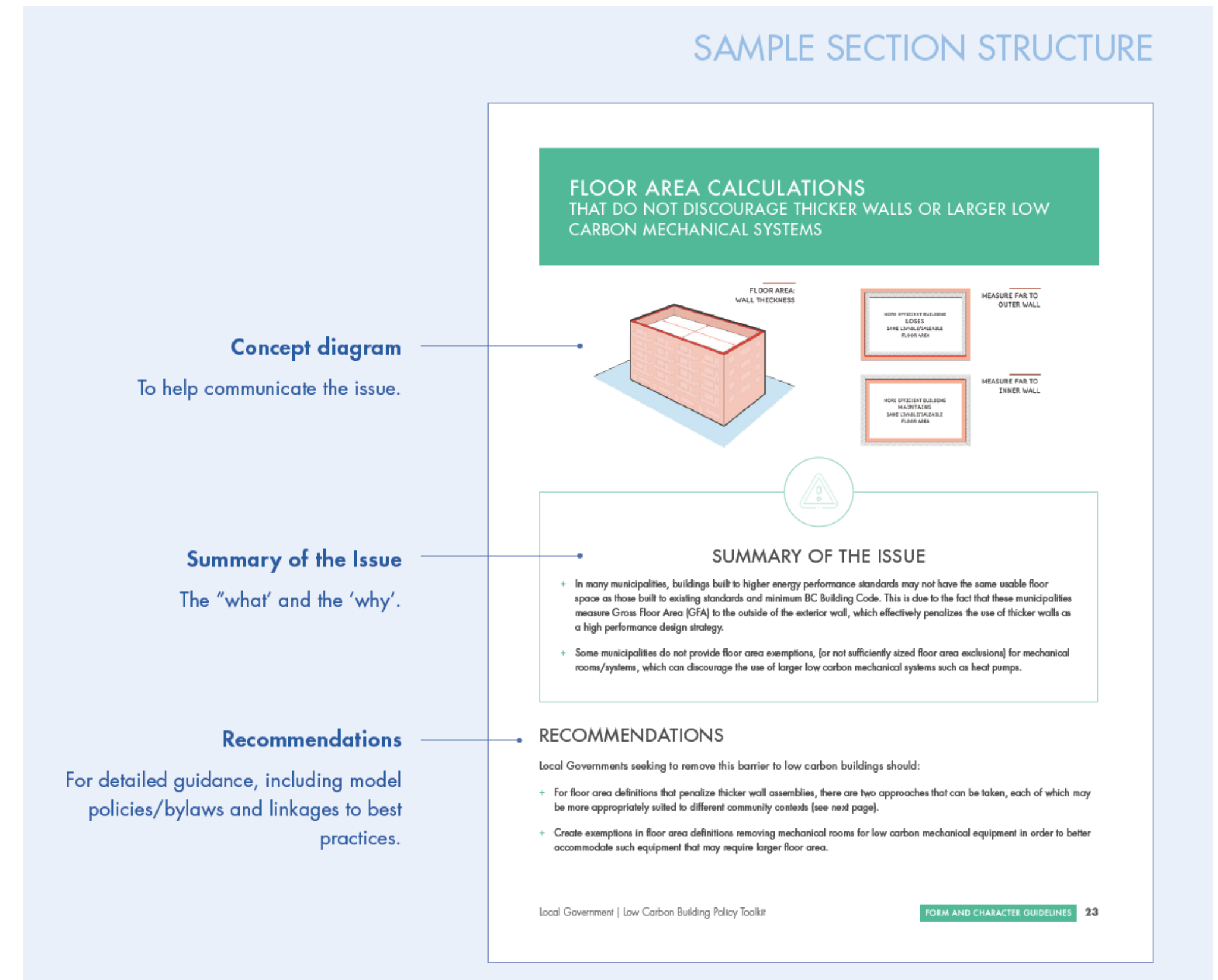
1. Enabling Low Carbon Buildings at Proposal / Rezoning Stage
2. Supportive Guidelines + Regulations at Design Development Stage
3. Optimized Noise Bylaws
4. Permitting and Approvals



# STRUCTURE & ORGANIZATION

## Repeating structure of each section for legibility

1. Summary of the Issue
2. Supportive concept diagrams
3. Recommendations
  - Model bylaws/policies where appropriate
  - Precedent imagery where appropriate





# TOOLKIT AT A GLANCE

- **Building on the Step Code:** 9 policy changes Local Governments can make to remove barriers and enable low carbon buildings in their communities
- Summary checklist for staff use
- Should be accompanied by industry engagement as per typical practice



9 policy changes Local Governments should make to remove barriers and enable low carbon buildings in their communities.

- The Official Community Plan includes policies that support climate action and low carbon buildings
- DP Form and Character Guidelines don't inhibit high performance design strategies, and include language that supports:
  - Simplified massing, limited articulation & good form factor
  - Lower overall window to wall ratio (with allowances for higher WWR at grade)
  - Optimized orientation to balance solar gains and losses
  - Exterior shading devices on building facades
  - Modest amounts of balconies and/or balcony strategies that limit thermal bridging
- Floor Area Ratio calculations don't discourage thicker wall assemblies
- Building Setback requirements don't discourage thicker wall assemblies
- Building Setback requirements don't limit heat pump siting
- Building height limits don't discourage thicker roof assemblies
- Build height limits don't discourage rooftop mechanical and renewable energy system installations
- Noise bylaws & interpretation do not inappropriately penalize HPs
- Heat pump permitting processes optimize heat pump uptake





# TOOLKIT RECOMMENDATIONS



# ALIGNING POLICIES AND GUIDELINES

TO SUPPORT LOW CARBON BUILDINGS

# OFFICIAL COMMUNITY PLANS

## Include 5 types of policies to support climate action

1. Continue to support other levels of government and other organizations
2. Set up future climate action projects (e.g., Climate Action Plan, EV Strategy)
3. Draw connection to other supportive OCP Policies (e.g., compact land use framework)
4. Support for low carbon building policy adoption (e.g., Step Code and low carbon approach)
5. Linking to GHG reduction and renewable energy targets

### **Example / demonstrative policies provided**

*E.g., Develop an implementation strategy for the BC Energy Step Code as it relates to land use designations permitting Part 3 and Part 9 buildings, including consideration for the inclusion of low carbon energy systems.*





# FORM & CHARACTER GUIDELINES

## Framing

- Lower Steps of Step Code do not necessitate changes to building form
- Upper Steps may in some cases
- High performance buildings can achieve urban design principles (and can be beautiful!)

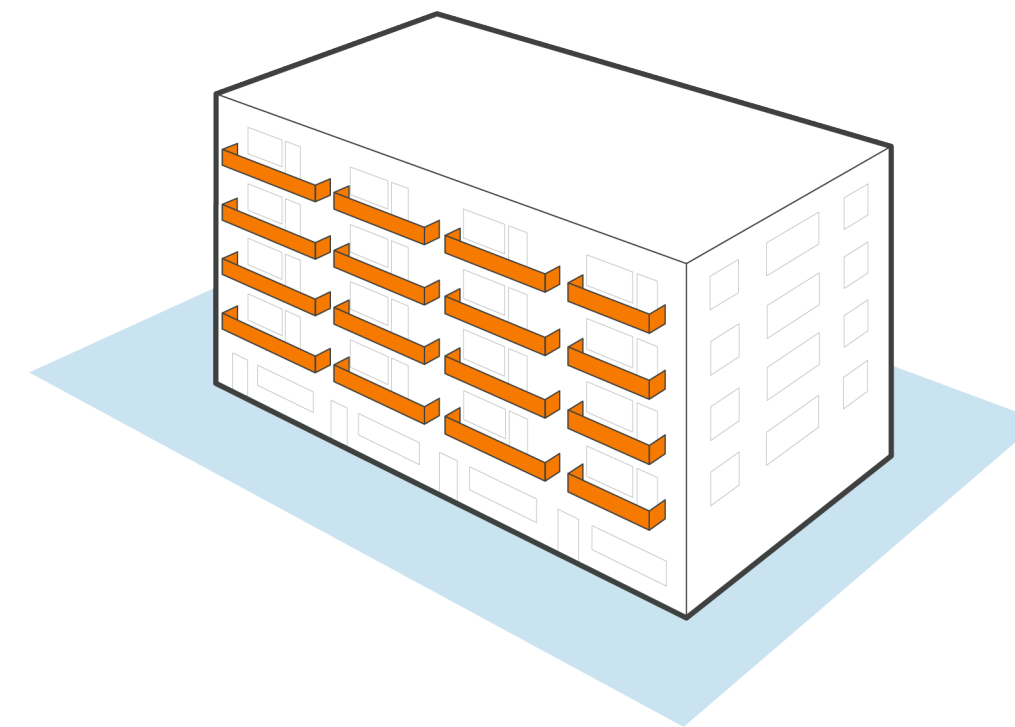


# FORM & CHARACTER GUIDELINES

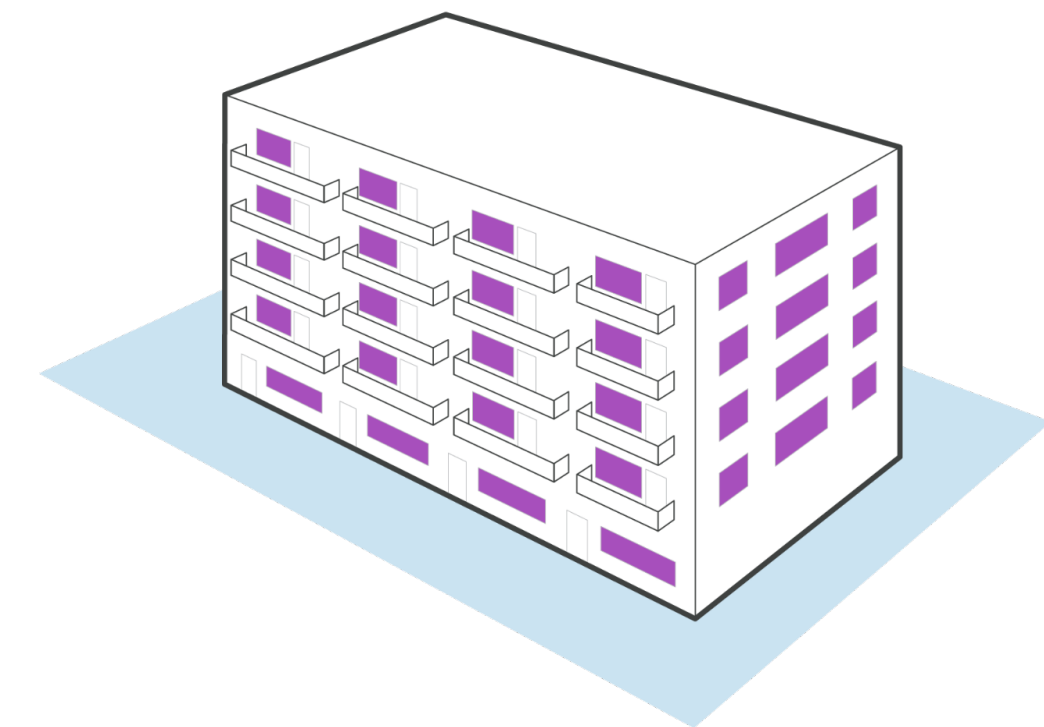
## Each section includes

1. Overview of the high performance design considerations relevant to each section
2. Common conflicts between Guidelines and high performance design strategies, including:
  - Illustrative Guideline
  - Summary of potential conflict
  - Recommended improvement, with example improved Guideline wording
3. Commentary & rationale
  - Based on compiled industry feedback and best practice research
  - Precedent image illustrating strategies, where appropriate

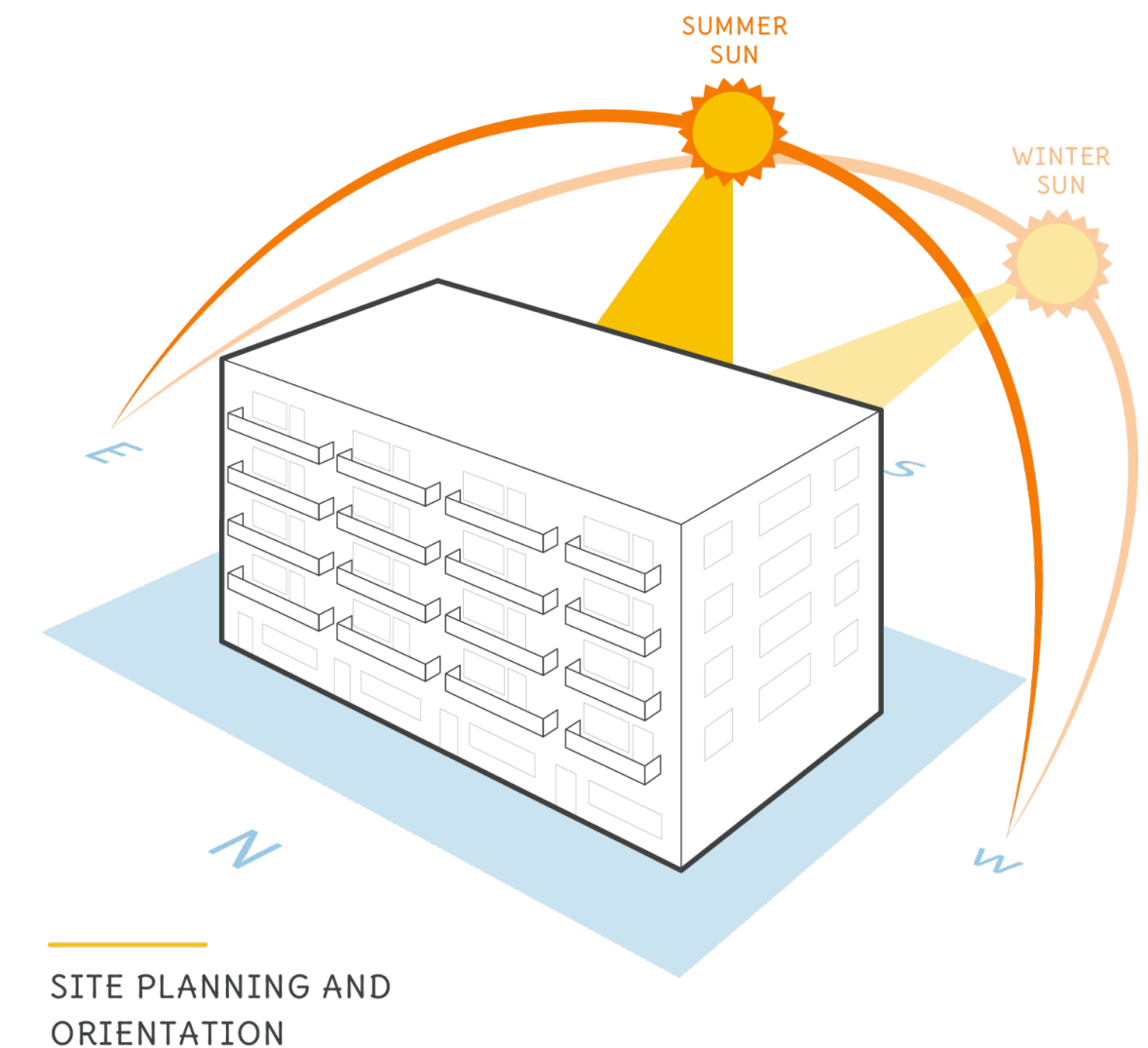
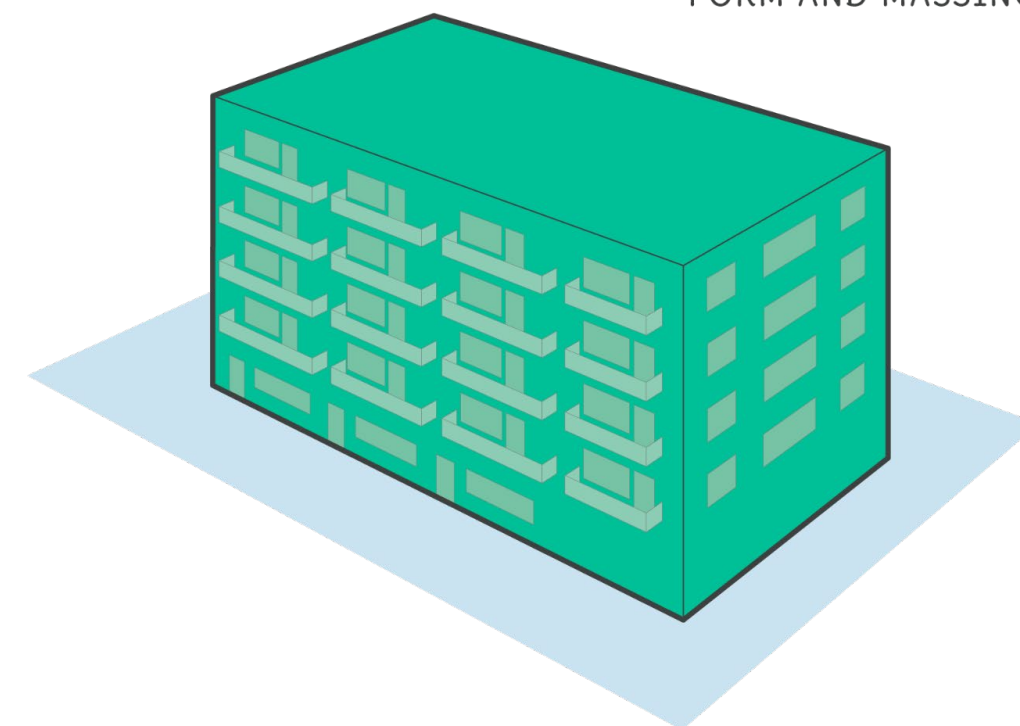
MINIMIZE  
THERMAL BRIDGING



LOW WINDOW-TO-WALL  
RATIO



SIMPLIFIED  
FORM AND MASSING





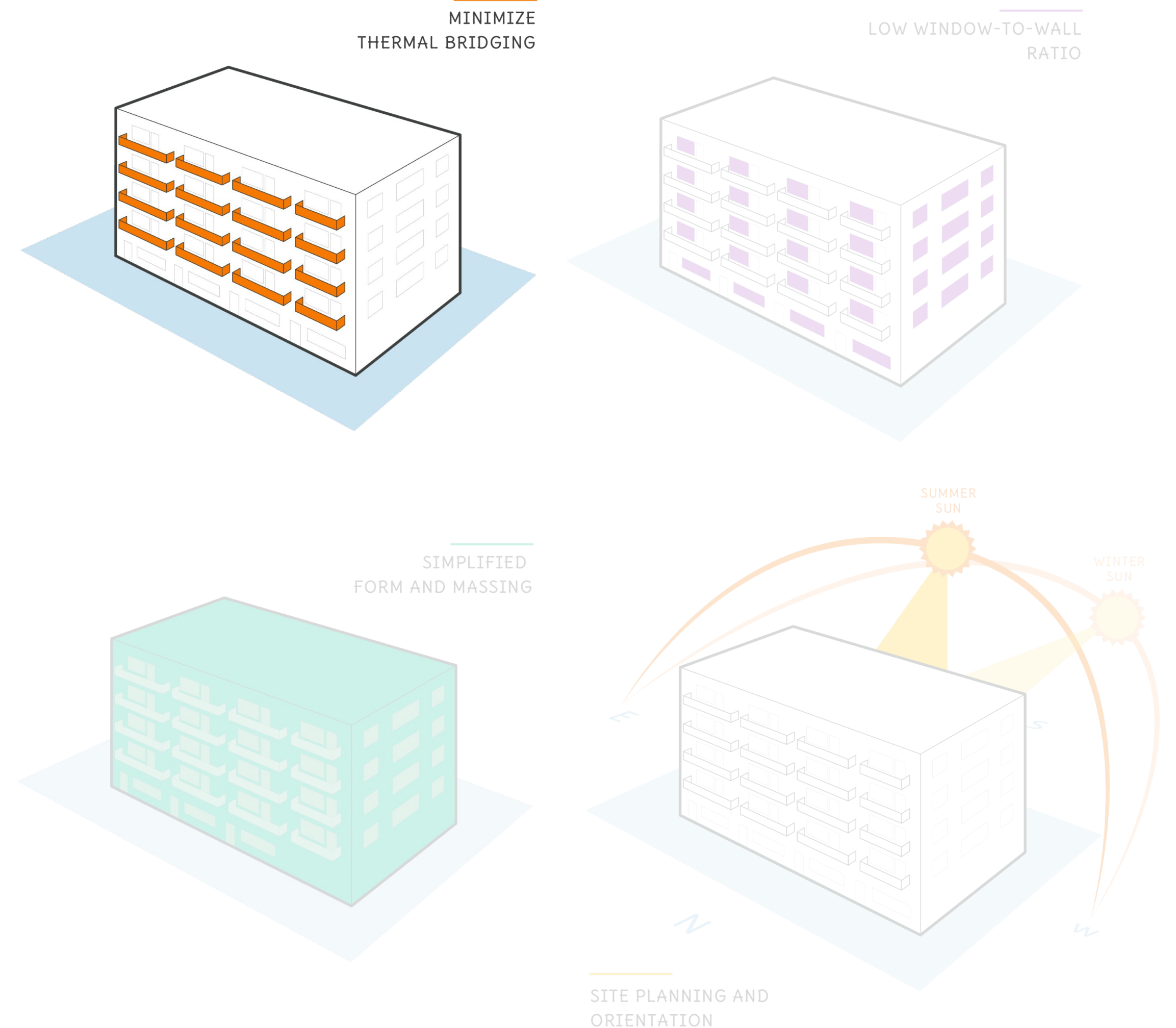
# BUILDING ENVELOPE MATERIALS AND DESIGN

## Common Form + Character Guideline

- **Illustrative Guideline:** *Incorporate and design balconies and other private outdoor amenity spaces to be an extension of interior living space to maximize usability.*

## Recommended Guideline Improvements

- Note thermal bridging potential with balconies and provide guideline support for alternative balcony designs that limit thermal bridging, such as:
  - externally supported balconies
  - balconies located outside of thermal envelope
  - use of thermally broken building products



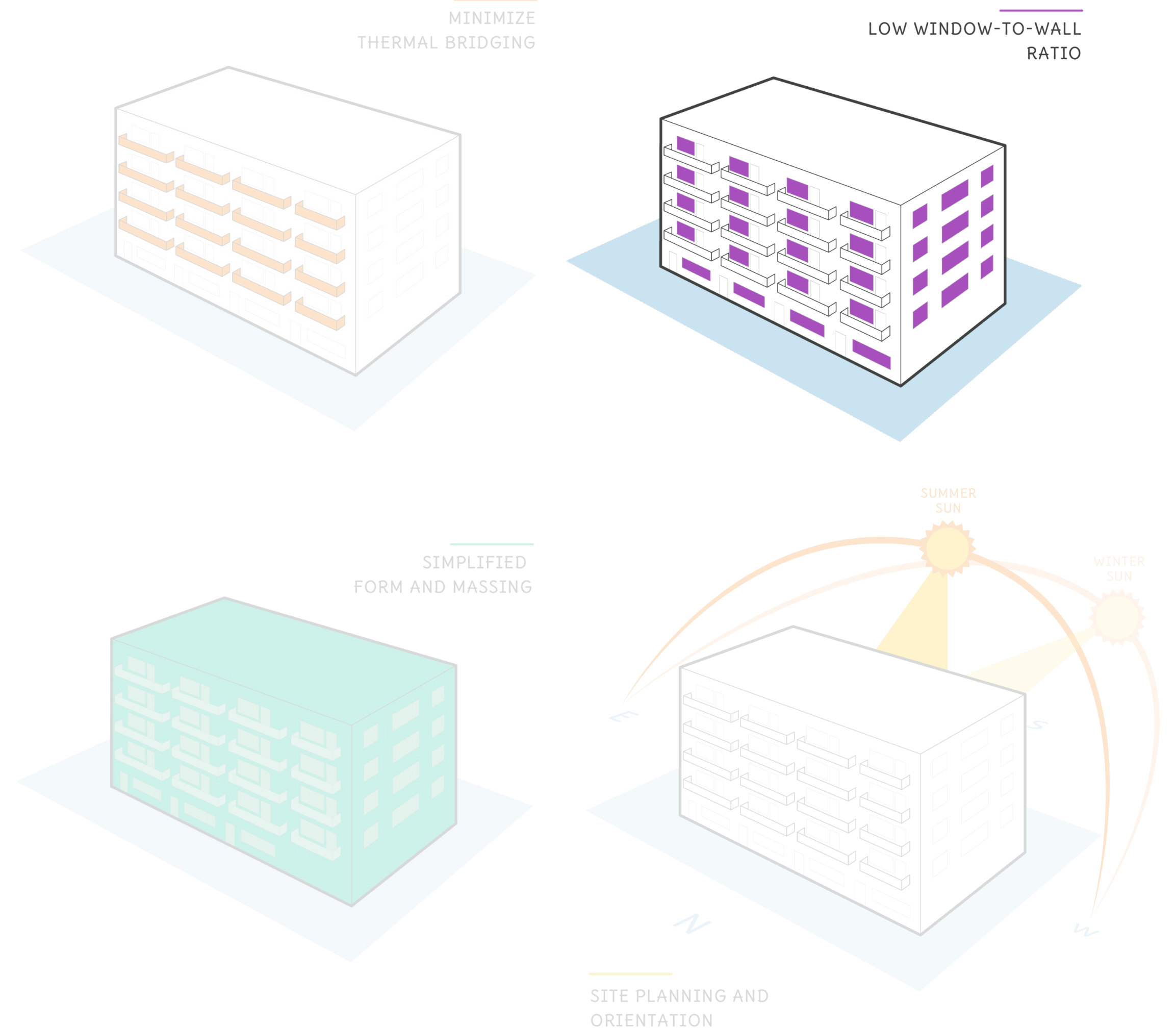
# SHADING + GLAZING

## Common Form + Character Guideline

- **Illustrative Guideline:** *Locate and design windows, balconies, and street-level uses to create active frontages and 'eyes on the street', with additional glazing and articulation on primary building facades.*

## Recommended Guideline Improvements

- Provide guidance around industry best practice (e.g., 40% window-to-wall ratio)
- Allow for higher WWR at grade to promote active frontages
- Allow for lower WWR ratios on north facing facades



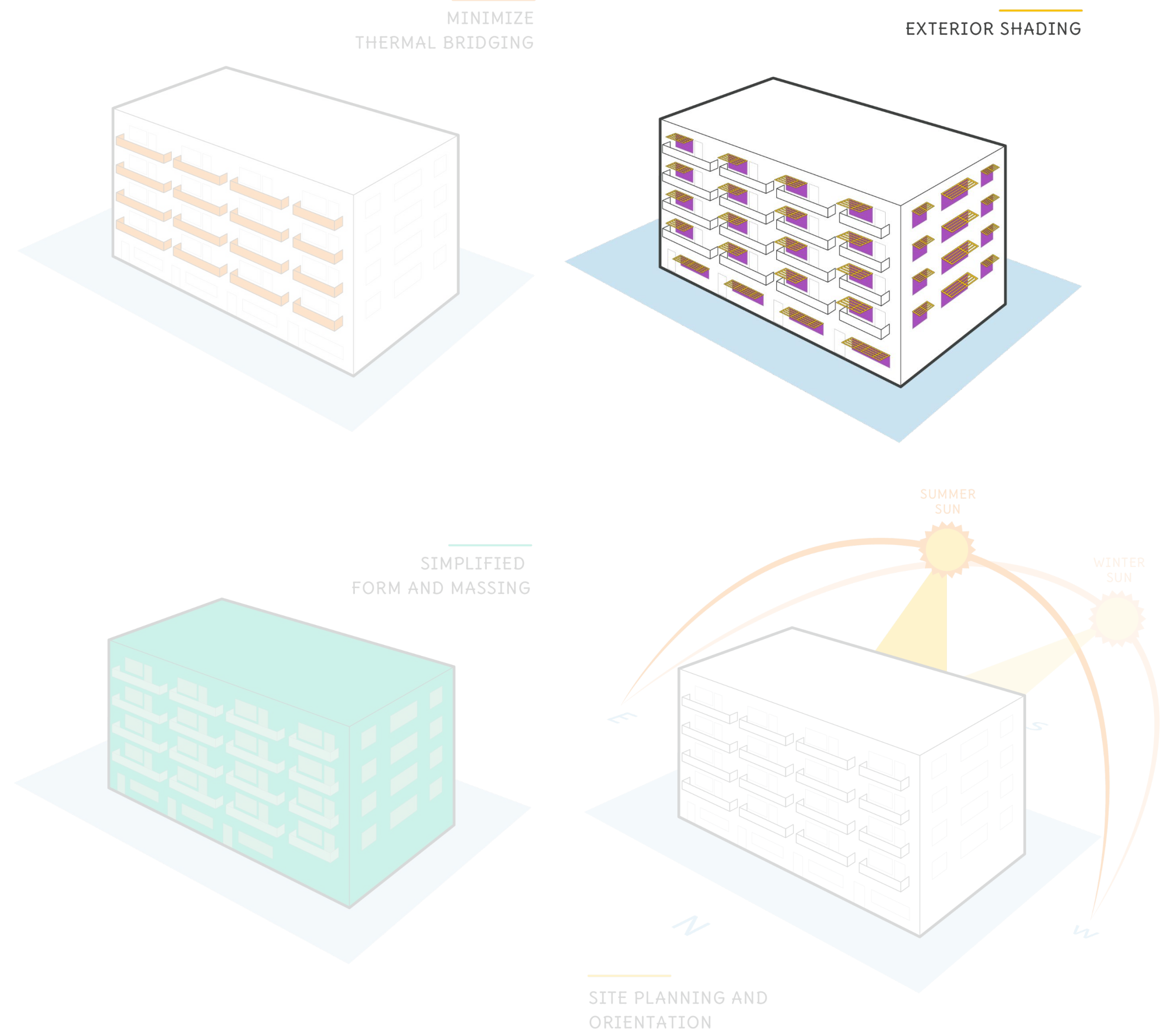
# SHADING + GLAZING

## Common Form + Character Guideline

- Guidelines commonly reference the use of exterior building ornaments such as awnings, but rarely note the use of exterior shading devices

## Recommended Guideline Improvements

- Ensure guidelines accommodate and support the use of exterior shading devices to prevent overheating and maximize occupant comfort.





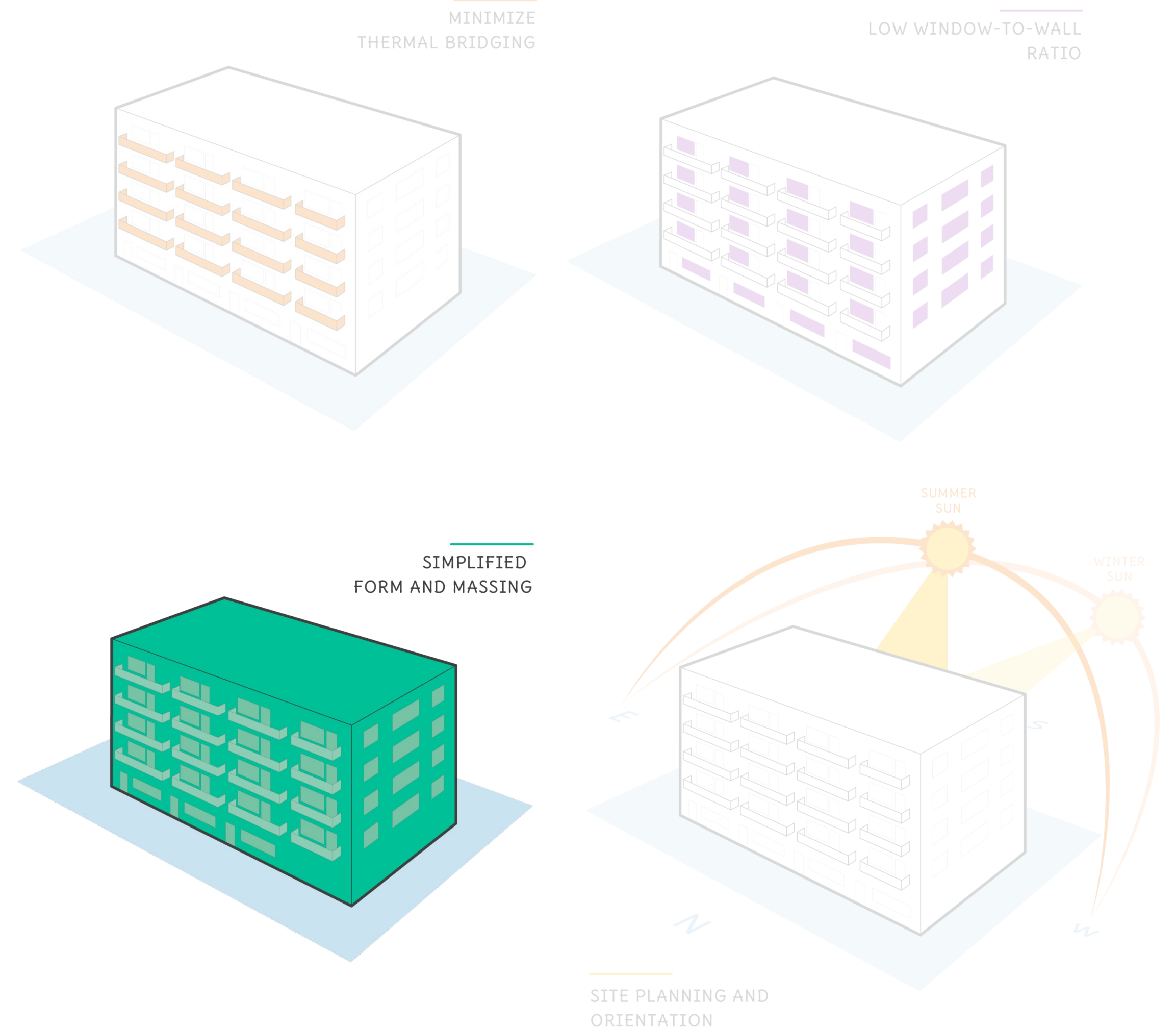
# MASSING + ARTICULATION

## Common Form + Character Guideline

- **Illustrative Guideline:** *Articulate facades by stepping back or extending forward a portion of the façade to create a series of intervals or breaks*
- Some guidelines for Part 9 'missing middle' typologies strongly encourage pitched roofs

## Recommended Guideline Improvements

- Provide flexibility for design strategies that allow for cost effective energy performance while articulating the building in other ways, such as:
  - Modest shifts in massing
  - Change in colour/materiality



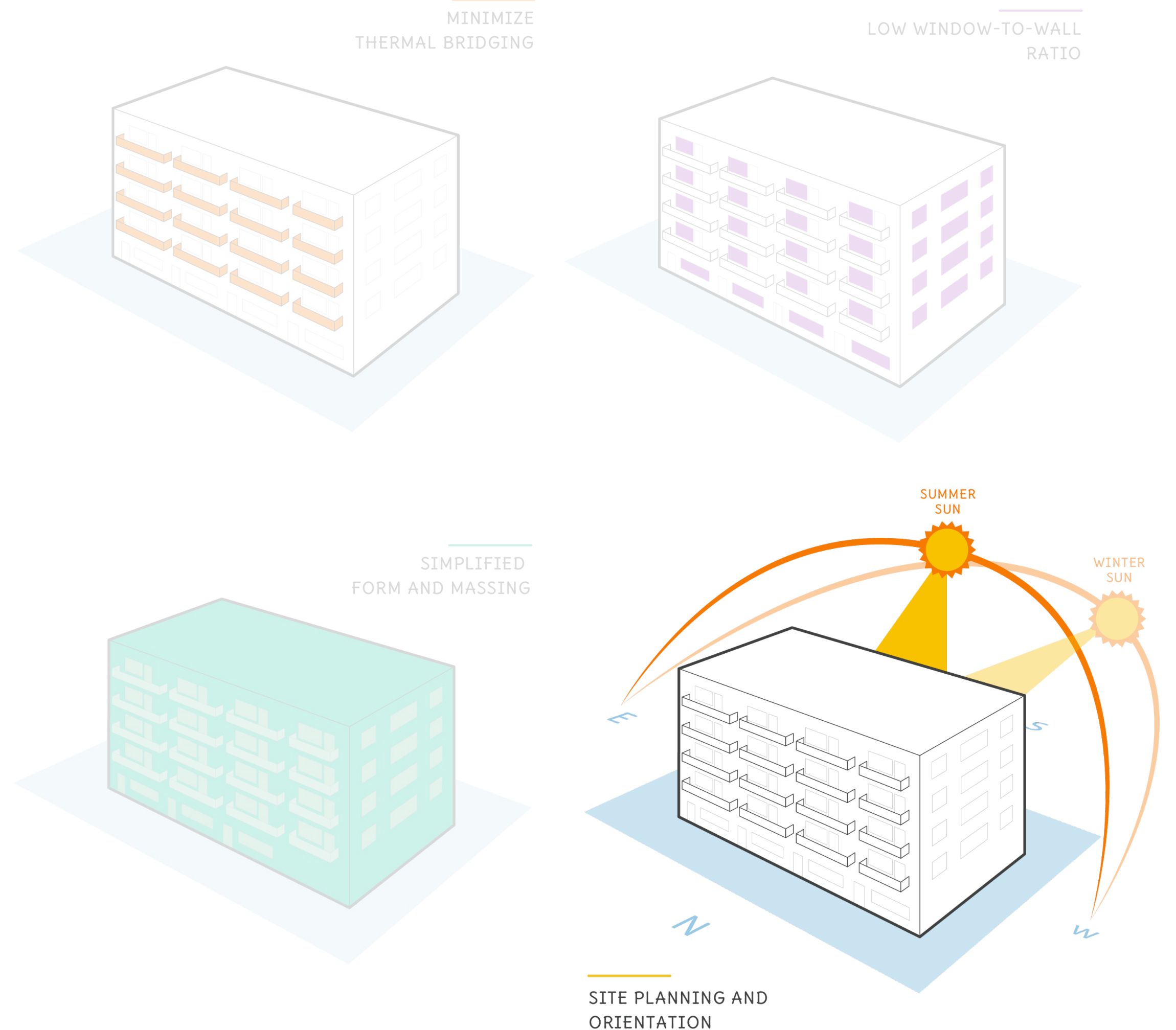
# SITE PLANNING AND ORIENTATION

## Common Form + Character Guideline

- **Illustrative Guideline:** *Building mass should generally be oriented in a north-south direction for portions of building above the established base building*

## Recommended Guideline Improvements

- Provide guidance for buildings to maximize solar access to adjacent streets and public spaces, while also optimizing for solar orientation to improve energy performance and occupant comfort



# RECOMMENDED OPTIONS FOR IMPLEMENTATION

1. Provide design exemptions/allowances for high performance design strategies that conflict with Guidelines
2. Review, update and/or write new Guidelines to improve overall alignment and support high performance buildings
3. Create new standalone/supplemental Guidelines that only apply to high performance buildings

## **Description and pros/cons of each approach listed.**

All included, acknowledging that different approaches may be more suitable to different municipal development contexts





# ZONING BYLAW IMPROVEMENTS

TO SUPPORT LOW CARBON BUILDINGS

# FLOOR AREA DEFINITIONS

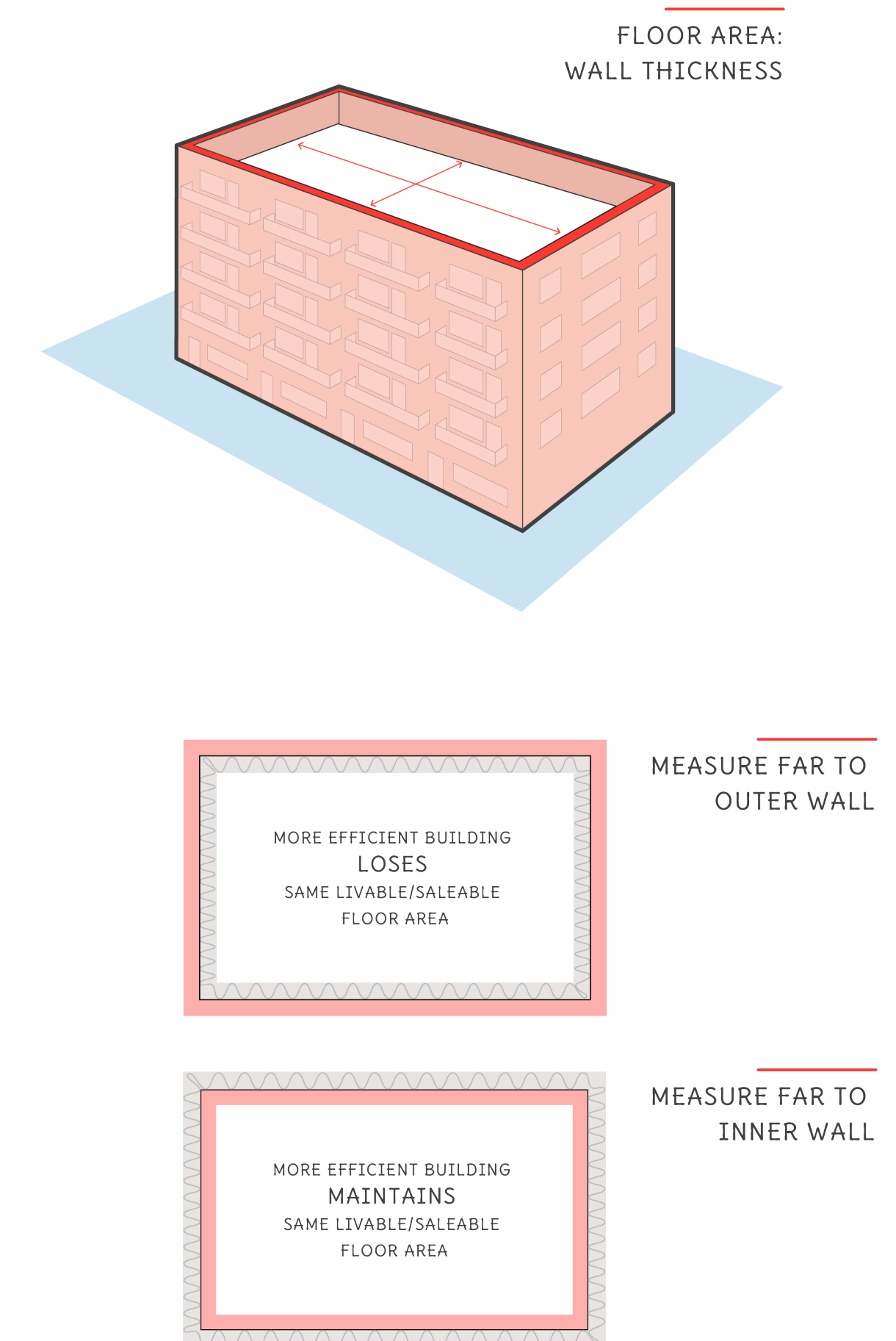
THAT DO NOT DISCOURAGE THICKER WALLS OR LARGER LOW CARBON MECHANICAL SYSTEMS

## Recommendations

1. For floor area definitions that penalize thicker wall assemblies, there are two approaches that can be taken, each of which may be more appropriately suited to different community contexts:
  - Update Floor Area Definition
  - Provide Floor Area Exemptions
2. Create exemptions in floor area definitions removing mechanical rooms for low carbon mechanical equipment in order to better accommodate such equipment that may require larger floor area.

## Example Zoning Bylaw Definitions provided

- City of North Vancouver



# BUILDING SETBACKS

THAT DO NOT DISCOURAGE THICKER WALLS OR OUTDOOR LOW CARBON MECHANICAL SYSTEMS

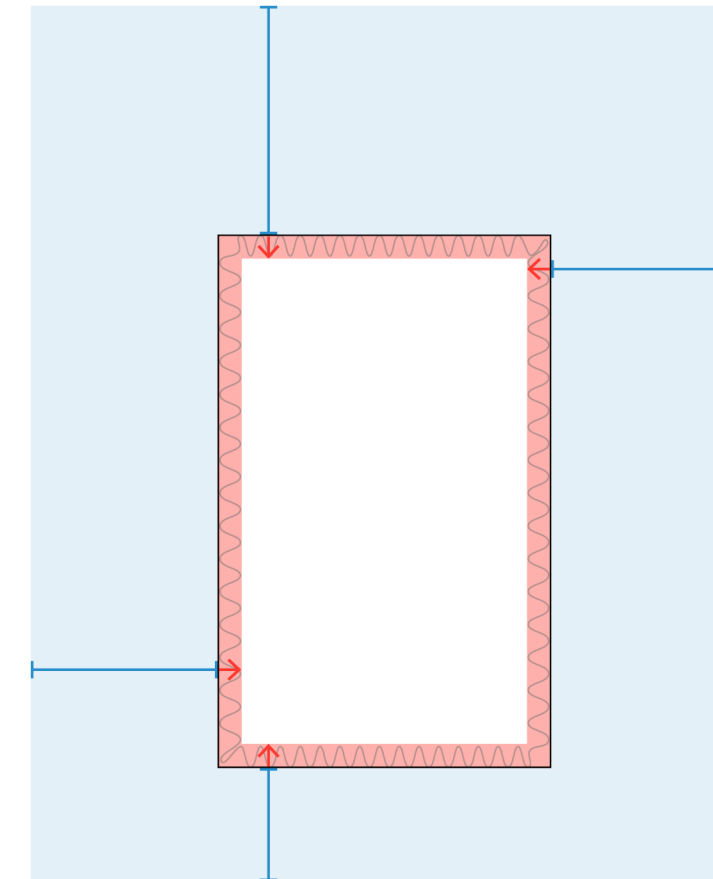
## Recommendations

1. Allow variances to building setbacks for thicker wall assemblies in support of high performance buildings
2. Update policies to allow the locating of heat pump outdoor units in any location, and providing guidance related to siting best practices and noise attenuation
3. Allow variances to building setbacks for the use of exterior shading devices

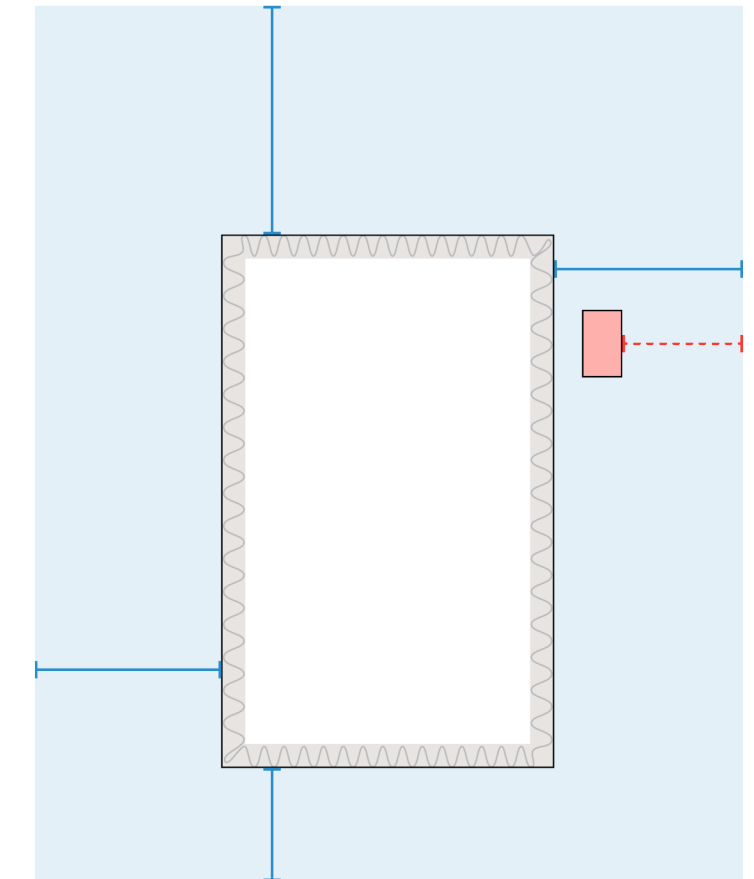
## Example Zoning Bylaw Definitions provided

- City of North Vancouver

SETBACKS DO NOT LIMIT  
WALL THICKNESS



SETBACKS DO NOT LIMIT  
SIDE YARD HEAT PUMPS





# HEIGHT LIMITS

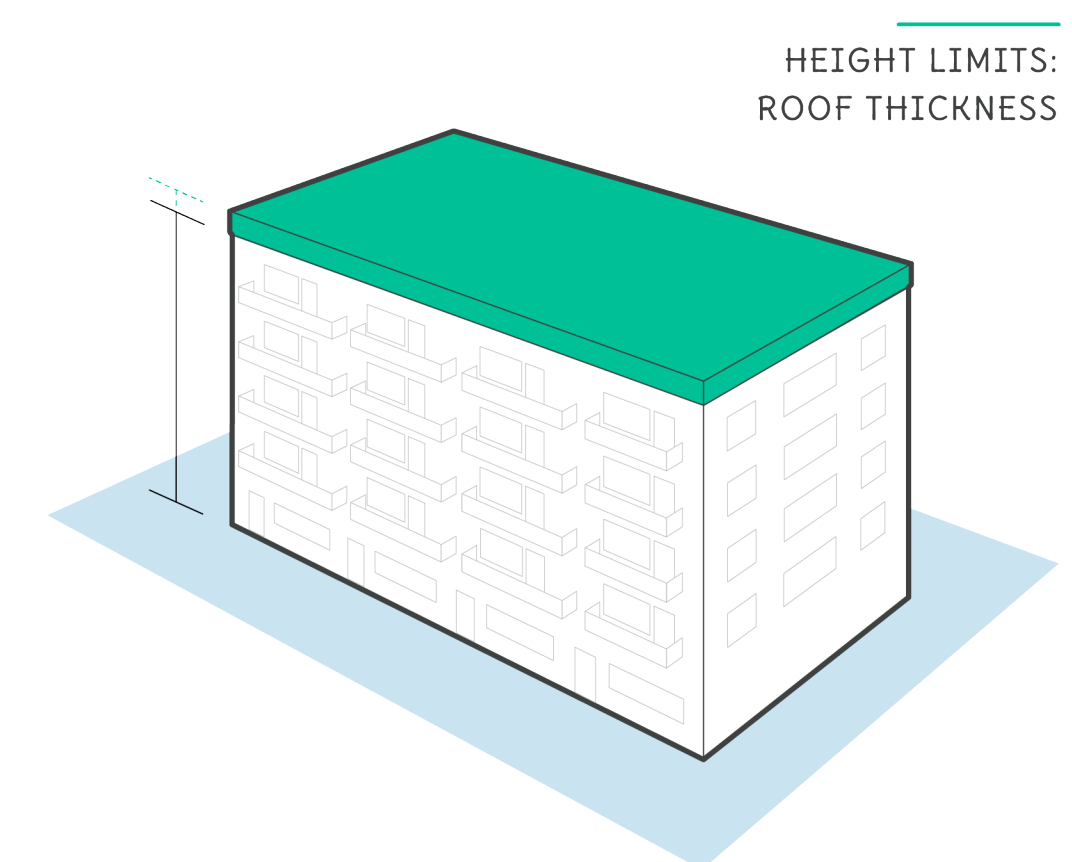
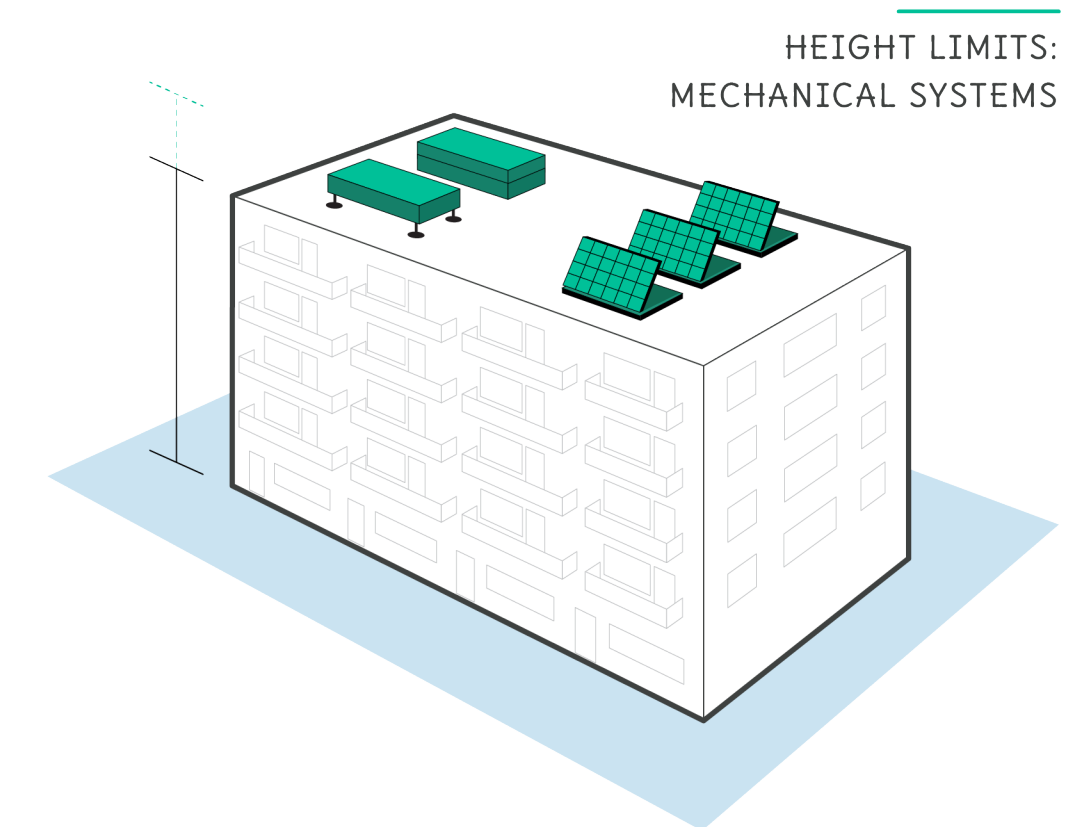
THAT DO NOT DISCOURAGE THICKER ROOFS, SOLAR ARRAYS, OR LOW CARBON MECHANICAL EQUIPMENT

## Recommendations

1. Create exemptions for thicker roof assemblies from height limit calculations in support of high performance buildings
2. Create exemptions for low carbon mechanical equipment (e.g., rooftop heat pump condensing units) and renewable energy systems (e.g., rooftop solar PV systems) from height limit calculations in support of low carbon, high performance buildings.

### Example Zoning Bylaw Definitions provided

- City of North Vancouver



# NOISE BYLAWS

TO SUPPORT HEAT PUMPS

# HEAT PUMP NOISE

- Some less efficient & improperly installed heat pump outdoor units can be noisy
- However, modern units are quiet (particularly efficient units with variable speed compressors)
- Some municipal noise bylaws (& their interpretation) can unfairly penalize heat pumps





# OPTIMIZED NOISE BYLAWS

## AND INTERPRETATION THAT AVOID UNFAIRLY PENALIZING HEAT PUMPS

### Recommendations

1. Ensure bylaw provisions are appropriate
  - No heat pump specific provisions
  - Reasonable provisions for noise levels from mechanical equipment
2. Ensure reasonable and consistent enforcement practices
  - Should not compare equipment's rated noise levels to bylaw limits, due to sound attenuation with distance
  - No blanket restrictions in heat pump outdoor units (e.g., in front or side yards). Could use:
    - 1) measurements or calculations at time of permitting (provided bylaw limits are reasonable), or
    - 2) complaint basis



PERMITTING

TO SUPPORT HEAT PUMPS



# STREAMLINED PERMITTING

## PROCESS FOR HEAT PUMP RETROFITS

### Recommendations

1. Communicate to development approvals, building approvals, inspections & front desk staff
  - Heat pumps are critical to achieving emissions reductions
  - Heat pumps provide other life-saving benefits (e.g., cooling, air-filtration during smoke events)
  - Permitting processes can meaningfully impact heat pump retrofit economics
  - A streamlined permit process is essential to achieve climate goals





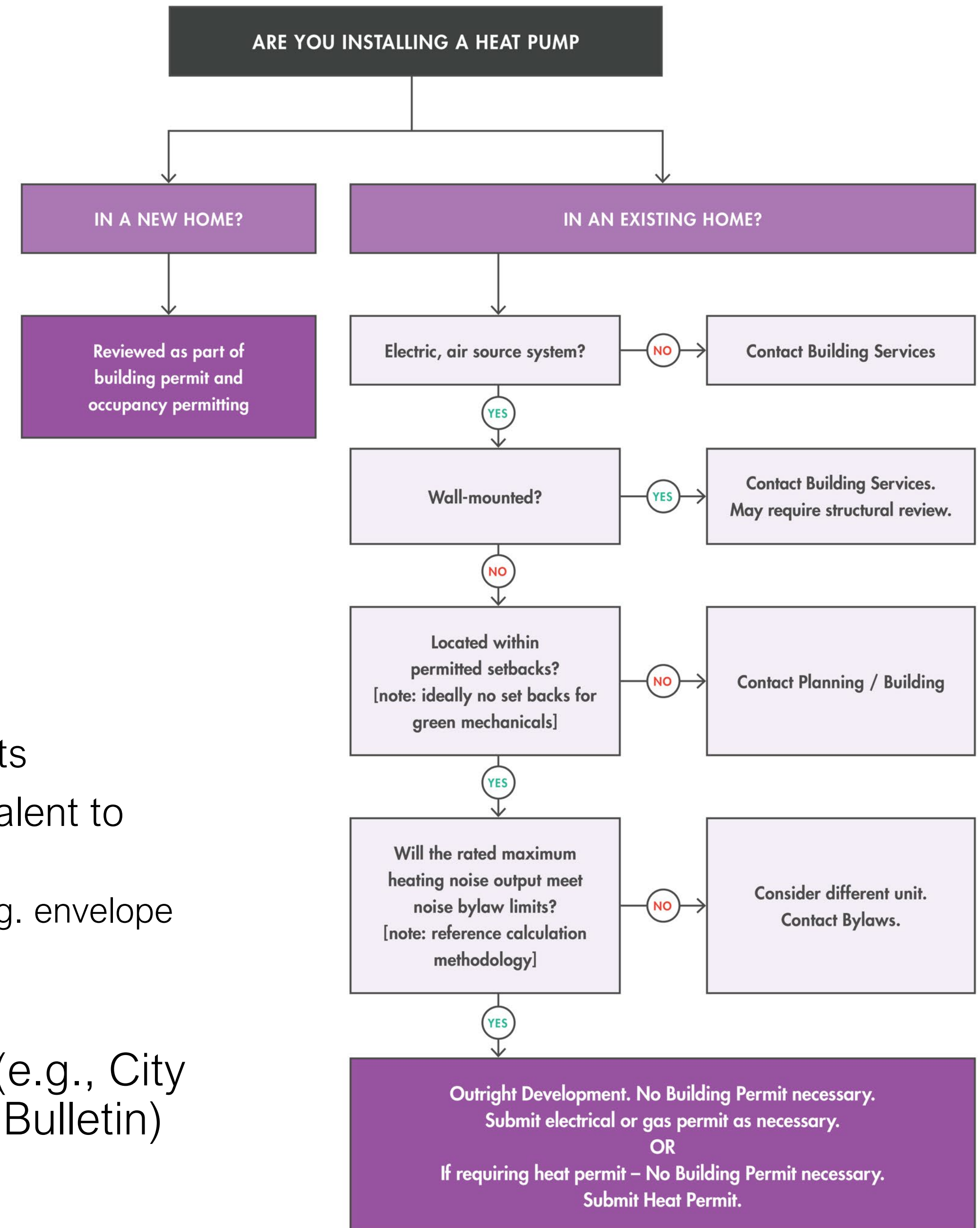
# STREAMLINED PERMITTING

## PROCESS FOR HEAT PUMP RETROFITS

### Recommendations

#### 2. Clarify and optimize permitting process

- Conditions for “Out Right” Development Permit
  - Aim for no DP for (most) HP retrofits
  - Appropriate setback; height; parking; noise etc. requirements
- Optimize Building Permit
  - Many local governments have no BP requirements for HP retrofits
  - If applying BP, seek to expedite – e.g. “Over the Counter” equivalent to trade permit
    - Consider common pre-approved specifications for building details (e.g. envelope perforations; structural; etc.)
- Bulletin establishing consistent expectations and guidance (e.g., City of Vancouver’s Heat Pumps for Ground Oriented Dwellings Bulletin)



# FUTURE EFFORTS

## ENSURE QUALITY MECHANICAL SYSTEM INSTALLATIONS

THAT MEET ENERGY PROVISIONS OF BC BUILDING CODE

### Recommendations

1. Consider adopting a thermal conditioning permit (i.e., heating permit)
  - Would support proper load calculations, mechanical design, and installations
  - Opportunity to require certified installers for quality assurance
  - Requires adequate staffing and resourcing
2. Explore some Provincial or regional-scale authority to delegate thermal permitting
3. Initiate a Program to proactively conduct room by room heat loss calculations

### Resource links provided

- Home Performance Stakeholder Council Heat Pump Best Practice Installation Guide for Existing Homes
- TECA Quality First courses



# HEAT PUMP FRIENDLY COMMUNITY OFFER

- BC Hydro Offer in development! (Stay tuned!)
- Will support communities to implement steps identified in the Toolkit that streamline heat pump implementation, and other low carbon building practices

## ***Questions***

- How can we best ensure participation in the Offer?
- In addition to the Toolkit, what resources do you need to adopt Heat Pump Friendly and Low Carbon Building practices?
- Would your community be interested in a workshop with development approvals & building staff to review the benefits of heat pumps, and ways to optimize permitting for implementation?





THANK YOU!

Devon Miller  
devon@originplanning.com

Brendan McEwen  
Brendan.mcewen@dunsky.com