

# Gentle Density and Energy Efficiency

Guidance Paper for Local and Provincial Government and Industry Partners

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# Acknowledgments

This Gentle Density and Energy Efficiency Guidance Paper was developed in collaboration with subject matter experts in the high-efficiency building sector - spanning industry, government and higher education. The energy efficiency roundtable is one of a series of expert roundtables hosted by Small Housing to address commonly recurring, challenging topics in the adoption of broader gentle density housing initiatives in British Columbia. In addition to the energy efficiency roundtable, other roundtables focus on topics including [affordability](#), [infrastructure](#) and [land economics](#).

SFU Renewable Cities supported the energy efficiency roundtable by compiling background research, facilitating the roundtable dialogue, and drafting the guidance paper content.



We would like to thank the roundtable participants and key informants for their generous commitment of time and willingness to engage critically and open-mindedly towards developing shared solutions.

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## Key informants:

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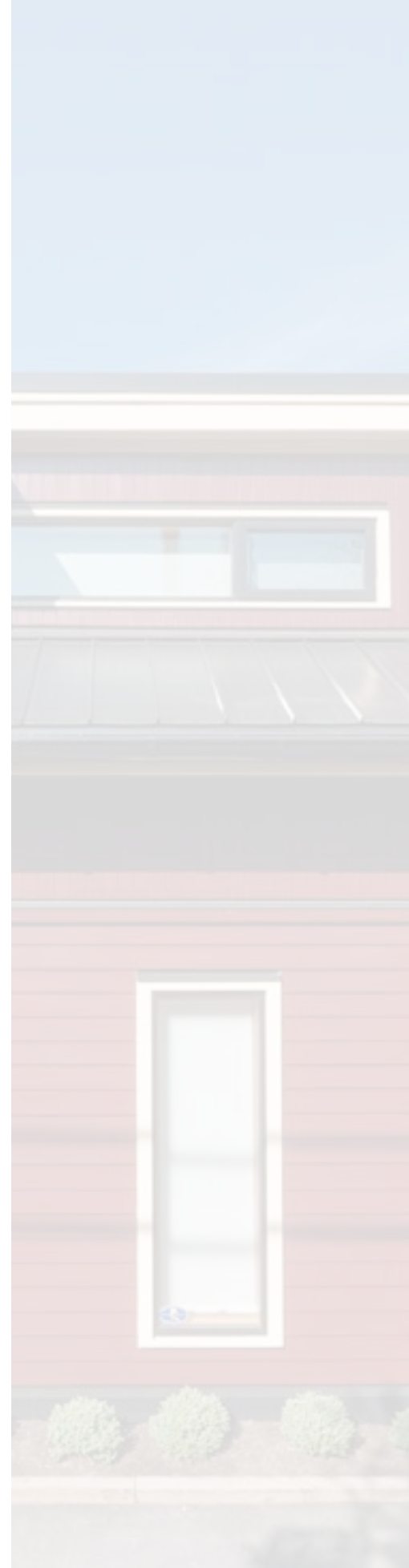
The recommendations presented in this guidance paper do not necessarily reflect the views of the individual roundtable participants and informants or the organizations they represent.

# Executive Summary

Communities across the province are facing significant challenges to meet the housing needs of their residents, while also working to achieve the requirements of the BC Energy Step Code and net zero readiness. Gentle density housing types, ranging from secondary suites and backyard infill through houseplexes and small townhouses present an attractive solution to growing our housing supply within our existing residential neighbourhoods. With Provincial policy set to increase density in single-family zoned land, Small Housing – with support from SFU Renewable Cities – convened a roundtable discussion to explore the relationship between gentle density housing types and energy efficiency. The Gentle Density and Energy Efficiency Roundtable included representatives from the high-efficiency building sector, spanning industry, government and higher education.

This Guidance Paper presents recommendations that will assist various actors involved in planning, designing and constructing energy efficient buildings, especially as it relates to new gentle density development. It provides background information and identifies challenges and recommendations in eight key areas:

1. Building industry productivity and collaboration
2. Expertise gap in building sector
3. Training and skills development
4. Standardization and process improvement
5. Challenges with legislation and bylaws
6. Focus on embodied carbon
7. Energy modeling and verification
8. Infrastructure and utilities



# Background

Gentle density housing solutions refer to the re-imagination of the single-dwelling zoned neighbourhood through small scale-infill development. These forms range from backyard cottages, laneway homes and secondary suites to houseplexes and infill rowhouses.



The BC Government has recently passed [new housing legislation](#) that will remove current zoning barriers for small-scale, multi-unit homes by allowing additional density in single-family zoned land and expediting approval processes. This legislation seeks to deliver more houses faster, with preliminary analysis projecting that more than 130,000 new small-scale multi-unit homes will be built in British Columbia over the next ten years.

Gentle density seeks to optimize land use while providing more housing options in neighborhoods without changing their character and feel. New construction brings the opportunity to integrate the best of environmental and energy standards and achieve the requirements of the BC Energy Step Code and net zero readiness.

[Citizen developers](#) (homeowners who want to be involved in the process to redevelop their properties) may consider gentle density housing projects to generate additional income, support multi-generational households and provide affordable housing options for their community. With proper knowledge and tools, a citizen developer has the potential to pursue a self-initiated gentle density development. To encourage uptake by citizen developers and builders that only have experience constructing single-dwellings, solutions must provide simple, achievable and replicable practices that reflect the small-scale nature of these developments.



# Challenges and Recommendations

The following section outlines the key areas of challenge highlighted through Roundtable dialogue, and provides recommendations for the Province, local governments and industry partners.

## 1. Building Industry Productivity and Collaboration

Coordination and collaboration between building industry professionals across the full project cycle is needed to achieve quality and efficient construction and design outcomes.



### Key Challenges

- Building industry professionals are working in silos, causing poor communication and disconnected processes that impact the transfer of knowledge and quality of work. Lack of team alignment causes increased supervision costs on construction sites and slows down the entire system.
- Tradespeople are often unaware of their role in the bigger project context, leading to resistance to change.



### Recommendations

- Enhance knowledge integration, collaboration and communication in construction teams through a team-based approach to training and processes.

## 2. Expertise Gap in Building Sector

Building industry professionals need specialized knowledge and training to achieve the requirements of the BC Energy Step Code and net zero readiness.



### Key Challenges

- A labour shortage across construction trades, including recruitment and retention, has led to a loss of organizational knowledge within companies/trades, decreased quality of work, lack of accumulated expertise, strain on existing staff, and knowledge transfer gaps with sector innovations.
- There is a significant lack of specialized knowledge in small-scale multi-unit residential builds, as well as high efficiency buildings.
- There is a notable path dependency among trades, leading to resistance to change processes and learn new methods. A decrease in subtrade knowledge is impacting project quality and efficiency.



### Recommendations

- Develop specialized training for trades and builders working on energy efficient gentle density scale buildings. This can contribute to bridging knowledge gaps and improving project efficiency and quality.

### 3. Training and Skills Development

Accessible and practiced-focused training that reflects the team-based nature of construction projects is needed to rapidly upskill construction professionals in energy-efficient construction techniques.



#### Key Challenges

- Small-scale builders and tradespeople are fragmented, posing challenges in gathering participants for training.
- Current training models have limited knowledge transfer; best practices include shorter, subsidized training sessions with concise and visual guides or materials that are easy to understand and use.
- Classroom-based learning does not reflect the unique context, needs and assets of construction workers, and without a practice-based approach, knowledge transfer and skill development will be limited.
- Training costs are a significant barrier to participation, with a notable increase in registrations when tuition is subsidized. The invisible and perceived costs of training, such as staff downtime, should be considered in training design and costing.



#### Recommendations

- Develop consistent, practical and subsidized training programs, including microcredentials and team-based learning opportunities, to upskill construction professionals and tradespeople in energy-efficient construction techniques.
- Training should account for the diverse learning needs of construction professionals and consider the fragmented nature of the industry to ensure effective, widespread knowledge transfer and adoption of best practices.

### 4. Standardization and Process Improvement

Standardized, modular design can support best practice principles and increase economy and efficiency.



#### Key Challenges

- Building permit processes are lengthy and can disincentivize energy efficiency gentle density development. Standardized designs could help to expedite permit processes, which would decrease costs and construction timelines.
- Customizing multiplexes and accessory dwelling units to meet energy efficiency requirements can be costly and time-consuming, compromising affordability goals. Standard designs of code-compliant homes could provide a cost-effective solution by lowering design and construction costs.
- Standardized, modular design must not imply a 'cookie-cutter' approach but provide accessible and adaptable designs to help bridge knowledge gaps and facilitate more straightforward construction.
- There are also risks with repeating the same building on different sites. Every site has unique characteristics to consider (e.g., topography, soil conditions, orientation, views, climatic considerations, access to daylight and solar gain, neighbours, access to amenities, vehicular/pedestrian access, cultural setting, local architecture style).



#### Recommendations

- Develop and implement standardized design approaches that promote energy efficiency without sacrificing customization, enabling quicker and more reliable construction processes.

#### Possible Solution

The BC Government is commissioning [new standardized designs](#) for small-scale, multi-unit homes, such as townhomes, triplexes and laneway homes. These designs have the potential to streamline design processes by modeling best practice energy efficiency design standards and making adoption more accessible.

## 5. Challenges with Legislation and Bylaws

Legislation and bylaws must recognize the unique considerations of gentle density developments and respond to new learnings and technical advancements in energy efficiency.



### Key Challenges

- The building industry is facing difficulties navigating legislation for gentle density developments. Municipal legislation and bylaws are typically not agile when faced with new learnings and technical advancements.
- The rigid difference in the code between Part 9 and Part 3 buildings means very different processes and skills are required for these building types, for both design consultants and contractors/trades. This results in a very fragmented industry. Bringing those two worlds together could be beneficial.



### Recommendations

- Advocate for the modification and modernization of bylaws to keep pace with technical advancements and evolving industry standards, ensuring regulatory frameworks support energy-efficient gentle density housing.

#### Possible Solution

The [Low Carbon Building Policy Toolkit](#) provides recommendations for local governments to develop policies and bylaws that support cost effective, low carbon buildings that meet the BC Energy Step Code.

For gentle density developments, it is important to consider:

- Form and character guidelines that align with and support low carbon building design and technologies.
- Floor area calculations that support thicker walls or larger low carbon mechanical systems.
- Building setback and height requirements that support thicker walls or roofs, shading devices, solar arrays, or outdoor low carbon mechanical systems.

## 6. Focus on Embodied Carbon

The building industry should shift focus towards whole-life carbon, balancing energy efficiency with embodied carbon.



### Key Challenges

- Energy efficiency and embodied carbon are sometimes in conflict, which can make balancing these approaches difficult.



### Recommendations

- Prioritize the assessment and reduction of embodied carbon in building materials and construction processes, acknowledging its significant impact on overall environmental sustainability.
- Promote circular economy and building reuse for sustainable development.



## 7. Energy Modeling and Verification

Reliable energy modeling software is important for verification and quality assurance of energy efficiency targets.



### Key Challenges

- Energy modeling software can be difficult to use; the quality of output relies on the knowledge of the energy advisor and their ability to use the software and work with it and around it.
- The quality and experience of Energy Advisors can vary, and more regulation is needed.
- Energy modelling is an important tool/metric to help guide the design process and moderate/policy quality, however the building industry does not always demonstrate a solid understanding of how energy modelling (and carbon modelling) functions. Modelling is not always entirely accurate, and relying on modelling results alone, rather than balancing its results with traditional design knowledge/skills, has resulted in many failed buildings.



### Recommendations

- Provide reliable, accurate and user-friendly energy modeling software to ensure accurate verification and ongoing quality assurance in energy-efficient construction.
- Further regulation of Energy Advisor qualifications should differentiate levels of knowledge and experience. Licensing should be enforced through mandatory membership to a governing association and requirements for continuing education credits.

## 8. Infrastructure and Utilities

Sufficient electrical supply and other infrastructure is needed to support gentle density energy efficient housing developments.



### Key Challenges

- Residential areas are mainly serviced by infrastructure designed to service single-family homes. Increasing the number of dwellings and implementing energy efficiency systems on these sites may require utility infrastructure upgrades, which can result in additional costs. However, infrastructure considerations should also account for household size and local population demographics. Smaller household sizes associated with gentle density may mean that existing infrastructure is adequate for increasing the number of dwellings in the area, and in some areas, infrastructure may be oversized.



### Recommendations

- Ensure that the necessary infrastructure, particularly electrical supply, is adequately planned and implemented to support the demands of energy-efficient and infill housing developments.

Gentle density housing through accessory dwelling units and multiplexes provides a promising solution to meet the needs of one part of the housing continuum. With support and action on recommendations by the Province, local governments and industry partners, barriers for citizen developers can be addressed to ensure these building forms are more economical and climate resilient.