Vienna House Innovative Affordable Housing Demonstration Project

Integrated Design Process Workshop No. 1

VIENNA HOUSE

BC HOUSING RESEARCH CENTRE

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BC Housing's Research Centre works in collaboration with housing sector partners to foster excellence in residential construction and find innovative solutions for affordable housing in British Columbia. Sharing leading-edge research, advances in building science, and new technologies encourage best practice. The Research Centre identifies and bridges research gaps to address homelessness, housing affordability, social housing challenges and the needs of distinct populations. Mobilizing knowledge and research expertise helps improve the quality of housing and leads to innovation and adoption of new construction techniques, Building Code changes, and enhanced education and training programs. Learn more about the Research Centre at www.bchousing.org. Sign up to receive the latest news and updates at www.bchousing.org/subscribe.

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Acknowledgments

Commissioned by BC's Forestry Innovation Investment Ltd., the findings and recommendations in this report are based on the information and feedback provided by participants in the workshops. These workshops are Integrated Design Process (IDP) charrettes being conducted to identify opportunities and establish the direction for achieving project goals for the Vienna House project with the guidance of the City of Vancouver, in partnership with BC Housing and the Vancouver Affordable Housing Agency.

Authors

This report was prepared by SCIUS Advisory.

Disclaimer

Contents

Summary

The cities of Vancouver and Vienna, Austria signed a Memorandum of Cooperation in early 2018 to rapidly advance green-building innovation in their respective cities. As a cornerstone of this collaboration, each city is developing a low-carbon, affordable housing project. Through these two projects, city staff, the project teams and industry experts in the two cities will exchange knowledge and experiences.

The City of Vancouver, in partnership with BC Housing and the Vancouver Affordable Housing Agency, is developing a high performance, mid-rise, social housing project in Vancouver that is at the early design stage.

Forestry Innovation Investment, in partnership with BC Housing, is funding four Integrated Design Process (IDP) charrettes with building experts and policymakers from the City of Vienna and the City of Vancouver. This process identifies opportunities and establishes the direction for achieving project goals for the Vienna House project in Vancouver, B.C. IDP is a method for realizing high performance buildings that contribute to sustainable communities. It is a collaborative process that:

- Focuses on the design, construction, operation and occupancy of a building over its complete life cycle.
- Is designed to allow the client and other stakeholders to develop and realize clearly defined and challenging functional, environmental and economic goals and objectives.
- Consists of a multi-disciplinary design team that includes or acquires the skills required to address all design issues flowing from the objectives.
- Proceeds from "whole building system" strategies working through increasing levels of specificity to realize more optimally integrated solutions.

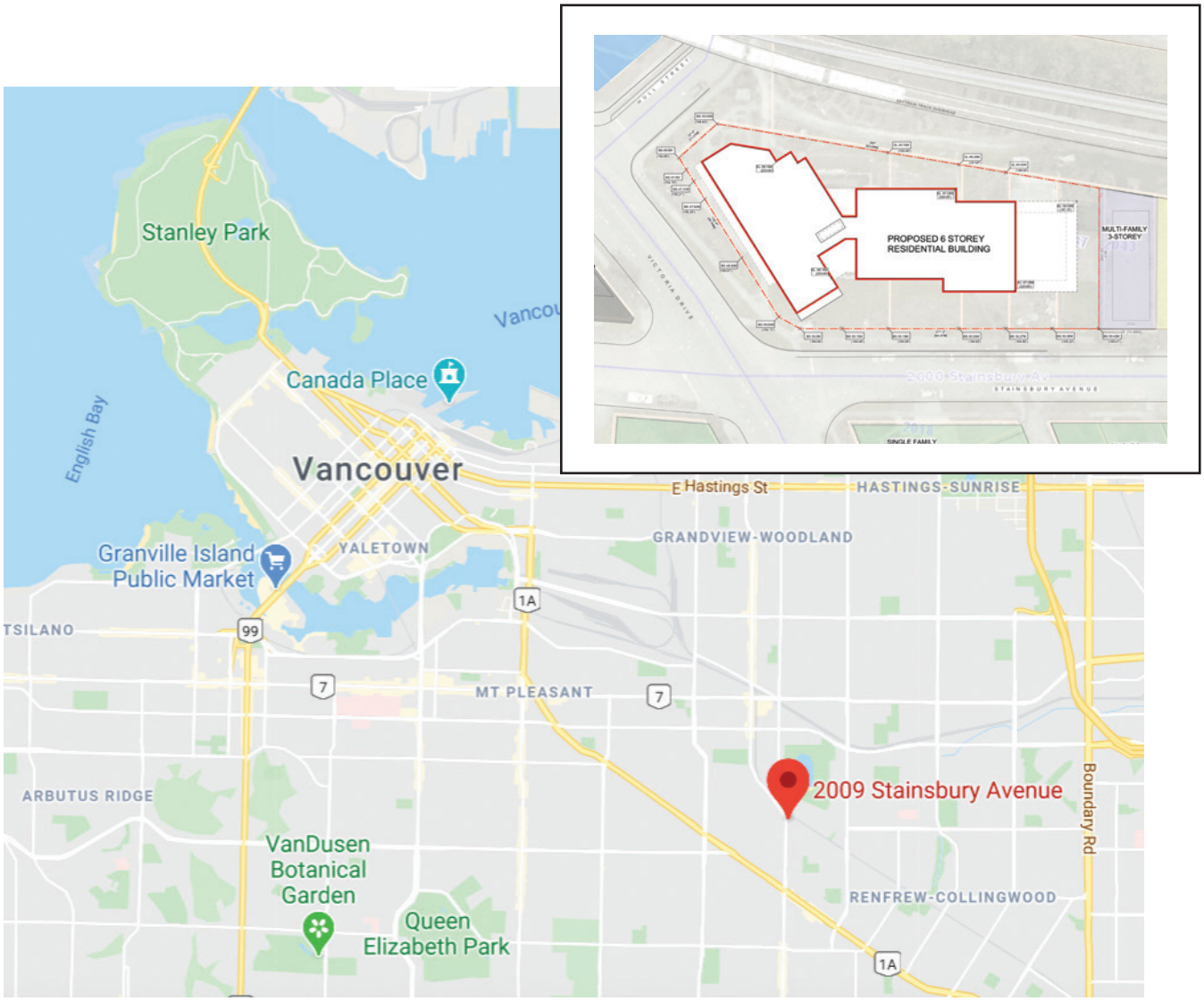
The first workshop was held on June 24, 2020. It consisted of 50 participants collaborating on Adobe Connect, an online conference platform, and was facilitated by SCIUS Advisory Inc. and Light House Sustainable Building Centre. The workshop brought together BC Housing, Vancouver Affordable Housing Agency (VAHA) and More Than a Roof Housing Society with industry experts, policymakers and researchers from Vancouver and Vienna to:

- **Share** information between Vancouver and Vienna on best practices in innovative affordable wood social housing projects.
- **Discuss** the Owners' "Conditions of Satisfaction" for the project (functional, economic, social, environmental, etc.).
- **Determine** state-of-the-art solutions and best practices relating to project team selection, procurement model and delivery method necessary for the project.

Project Context

The project is located at 2009 - 2037 Stainsbury Avenue (at the intersection with Victoria Drive) in Vancouver. Vienna House will be a six-storey social residential building with 106 rental units. Our vision is to demonstrate affordable, climate resilient, near-zero-emission (operational and embodied) housing through the exploration of different procurement models, prefabrication processes and community integration approaches. The rezoning process is underway and the operator, More Than A Roof Housing Society, is onboard. There is a particular focus on state-of-the-art wood structural and envelope systems.

Location and site plan



Level 1 plan and rendering of Vienna House as submitted for rezoning enquiry to the City of Vancouver (Courtesy Yamamoto Architects)

Project Objectives

The project objectives are to provide an affordable social housing project that contributes to market transformation, improving availability, affordability of energy efficient and/or low-carbon building solutions.

The key focus areas, defined by BC Housing, VAHA and City of Vancouver, include:

1. **Low-Carbon, Affordable Housing**: The Vienna House project aims to achieve the lowest possible carbon emissions, while keeping the building affordable. The strategies adopted in this project are intended to be replicable in future affordable housing projects in Vancouver and the B.C. Lower Mainland. During the design process, the team will analyze the affordability of various energy reduction goals and choose the ones that best fit the project's need and budget.

2. **Resilient Design**: The impact of rapidly changing climate is already being experienced in all countries around the world. Authorities and industry leaders are exploring the ways in which buildings can be designed to adapt to these changes. Vienna House will explore solutions for a resilient design by considering future climate and post-disaster requirements in its design process. This project will demonstrate innovative mechanical system solutions to maintain thermal comfort in this social housing project in the face of climate change.

3. **Procurement Innovation**: To succeed in achieving the project's complex goals, City of Vancouver and BC Housing are committed to incorporating innovative procurement methods. To do so, all the partners' procurement staff will participate in the development process. Additionally, North American and Viennese experts will be consulted to identify the best alternative contracting methods for setting targets and creating commitments.

4. **Knowledge Transformation**: While the local experts will design and build the project, experts from Vienna will offer their experience in delivering affordable low-carbon housing in a large scale. Potential areas of contribution could include advice on: request for proposals, advanced building components, alternative approaches to mechanical heating, ventilation and air condition systems (HVAC), and envelope design.

Preparing for the Workshop

Normally, IDP charrettes are conducted in a highly collaborative fashion with the entire project team face to face in a large meeting space over the best part of a day. Due to travel restrictions arising from the COVID-19 pandemic, the Adobe Connect platform was used. Time zone differences between Vancouver and Vienna meant that only three hours were possible in one session.

Adobe Connect is a powerful engagement tool. The platform was new to most of the participants. To ensure that everyone was able to participate in the limited three hour workshop without having to learn the technology, a one hour tutorial was held on July 18, 2020. This session allowed the facilitators to introduce the workshop series overall as well as the key project team, and review the purpose of Workshop 1. The agenda is presented in Appendix 1.

To further assist with optimizing the workshop time, participants were provided with a briefing package ahead of time which included the agenda and access to a shared folder with a series of supporting documents (listed in Appendix 2). Key documents for the workshop were the rezoning submission plans for Vienna House and the Project Charter which described the project goals (Table 1 next page).

Project Goals and Objectives Tables

Table 1: Project Goals and Objectives presented in order of priority

Objective	Measures/Methods/Features	Notes	Decision Rationale	Consensus	Action Item
Near Zero Emissions	Options are: a) Passive House. b) "Passive House-like". c) Energy Step Code - Step 4 TEDI ≤ 15 kWh/m²/yr.	BC Housing Preference: c) Energy Step Code - Step 4. CoV Preference: a) Passive House.	BC Housing: As per BC Housing Design Guidelines, it is mandatory to meet Step Code 4 for LM projects. CoV: Step 4 is minimum allowed for 6 storey MURB under rezoning and will be code in 2021. City Policy requires VAHA to show leadership (better than requirements) and VAHA projects to pursue Passive House certification.	**Led by Sadia Afrin, BC Housing** Passive House or Net Zero: › CoV requires this project to reach higher standards than Energy Step Code 4. › Suppliers will need to provide GHG targets and demonstrate how this will be achieved. "Passive House-like": › There is a preference to achieve PH certification. › CoV (Chris Higgins) to provide cost/benefits of pursuing PH certification. › CoV to share costing of a project of similar style and size. › PH construction leads to low GHG emissions and will not require providing a target.	CoV to provide costing data of a project of similar style and size. CoV to provide cost and benefits of pursuing PH certification.
Zero Emissions	a) GHGI ≤ 5 kg CO2e/ m²/yr. b) GHGI ≤ 1.5 kg CO2e/ m²/yr. c) Passive House.	BC Housing Preference: a) GHG reduction in line with CoV Green Building REzoning Policy GHGI ≤ 5 kg CO2e/ m²/yr. All Electric: All electric Step 4 is approximately 1.5 kg CO2e/ m²/yr. CoV comment: This is not a separate objective from 1, and only useful if Passive House is not feasible.	BC Housing: Depends on Clean BC Act. CoV: City Policy requires VAHA to pursue Passive House. Providing potential fall-back mechanisms if Passive House is proven to be unfeasible to the design and construction team at the outset is not productive.		

Objective	Measures/Methods/ Features	Notes	Decision Rationale	Consensus	Action Item
Offsite Fabrication	a) Panelized construction. b) Prefabricated construction, but not box modular. Note: Wood construction preference.	BC Housing Preference: a) Panelized construction. CoV Preference: Undertake market sounding to determine optimal offsite fabrication approach for this project prior to procurement.	BC Housing: Different options of panelized construction currently in the market and those which are quite innovative may be worth exploring. CoV: City hypothesis is that increasing industry capacity for off-site fabrication will be critical to affordable low-carbon construction. However we lack knowledge of industry capacity to deliver and which approach is best suited for this building with these objectives.	**Led by Sean Pander, CoV** **High Priority** BC Housing preference in pursuing panelized construction to gather more data. Innovation should not come at a cost of using the best product and process available to reaching project objectives. Determine which approach the market indicates is best to meeting project objectives. › Provide market with project objective and get feedback on best construction approaches. › Facilitate meeting with suppliers. BC Housing to help compile a list of suppliers of modular and panelized systems. › Have individualized meetings to discuss possible options and approaches. › Elimination process after interviews will determine which is the best construction approach and procurement strategy.	Determine which approach the market indicates is best to meet project objectives: › Provide market with project objective and request feedback on best construction approaches. › BC Housing , CoV and VAHA to facilitate meeting with suppliers. BC Housing to compile a list of suppliers of modular builders and panelized systems to be contacted. Have individual meetings to discuss possible options and approaches. Post interview evaluation and elimination process. Determine best construction method and procurement strategy.

Objective	Measures/Methods/ Features	Notes	Decision Rationale	Consensus	Action Item
Collaboration	Design and construction team will work in close collaboration with one another and the client (utilizing formal integrated design process) as well as with non-profit society. Vienna experts and knowledge transfer team through all project phases.		CoV: Cost effective building requires an IDP approach among the teams. Vienna has experience with high performance affordable housing.	**Led by Sean Pander, CoV** Collaboration is required by all parties, construction, design, operators, researchers, BC Housing, CoV, UBC, VAHA and Vienna. Invite Vienna to participate and share knowledge in all aspects of the project: › Share project objectives with Vienna. › Determine where Vienna's input would be best served, request their feedbback. › Determine what is the Vienna construction model. › What construction model does Vienna recommend and what information/guidance can they share? Conduct market sounding research to determine what percentage of Vienna's housing market is social housing, panelized construction, low carbon housing.	Invite Vienna to participate and share knowledge in all aspects of the project. Conduct a WebEx meeting with Vienna to learn more from them about their market. Conduct market sounding research to determine what percentage of Vienna's housing market is social housing, built with panelized construction and is low carbon housing.

Objective	Measures/Methods/ Features	Notes	Decision Rationale	Consensus	Action Item
Innovative Procurement	a) CCDC 14 - contractor to retain Design team. b) CCDC 5B - Separate contracts for Design Team/Construction with fixed price after pre-construction. c) IPD. d) Engaging Vienna architect. Note: BC Housing to issue agreement to Society operating building.	BC Housing Preference: b) CCDC 5B - Separate contracts for Design Team/Construction with fixed price after pre-construction. CoV comment: Innovative procurement is a means to effectively achieve objectives 2 and 3 and not an objective in itself. Procurement tool cannot be determined prior to resolving 2.		**Led by Michael Lachocki, BC Housing** BC Housing to lead procurement and RFI process. Results of market research will determine construction method and procurement process. › Conduct market sounding. › CoV (Chris Higgins) to lead market sounding study. › Cast wide net to obtain best market information/feedback. › BC Housing to provide top 10 list of pre-qualified modular, wood construction, panelized and concrete pre-fabricators. › CoV also to provide list of possible suppliers. › CoV to send out invitations once interview approach has been chosen. › BC Housing, CoV and VAHA to conduct interviews with each supplier independently or in a group. › Results from feedback/interviews will determine the construction approach and guide the procurement process.	BC Housing to lead procurement and RFP process. Conduct market sounding study (CoV to lead): › BC Housing, CoV and VAHA to conduct interviews with suppliers. › Conduct post-interview evaluation and elimination.

Objective	Measures/Methods/ Features	Notes	Decision Rationale	Consensus	Action Item
Knowledge Transfer	a) This includes supporting documentation process, dissemination of discussions and activities, filming and weekly interviews with researchers and co-op students. b) Vienna architect and builder to be included in IDP workshops. Organize conference call/presentation for City of Vienna team to exchange ideas and strategies to inform our project goals. Learn from City of Vienna about their strategies and innovative solutions. This step needs to happen asap.	Effectively integrating Vienna architect and builder will require funding support outside of the actual development scope. Process to identify Vienna architect and builder partner will depend on the off-site fabrication approach selected but will be supported by the City of Vienna. City of Vienna would like to identify timing for staff and their identified architect and builder to visit Vancouver (for IDP and more general knowledge gathering).		**Led by Denisa Ionescu, BC Housing** BC Housing to enter into contract with UBC in partnership with CoV and others: › UBC has provided a listing of core activities. › UBC will provide a proposal once research requirements have been established. › Knowledge transfer cost is estimated at $215,000 over 3yrs. › Other partners will be approached for funding. BC Housing Communications will provide feedback before finalizing and publishing research reports, advertise related education events, develop a Communications plan including social media. Team will need to determine how proprietary information will be approached: › How will this be evaluated? › RFP should state requirements of sharing all project info with research team.	No immediate decisions required. Determine research requirements. BC Housing to enter into contract with UBC in partnership with CoV and others. Approach possible funding partners to help cover research portion of project. Approach funding partners to help cover costs of Vienna collaboration. BC Housing Communications to review contracts before being finalized.

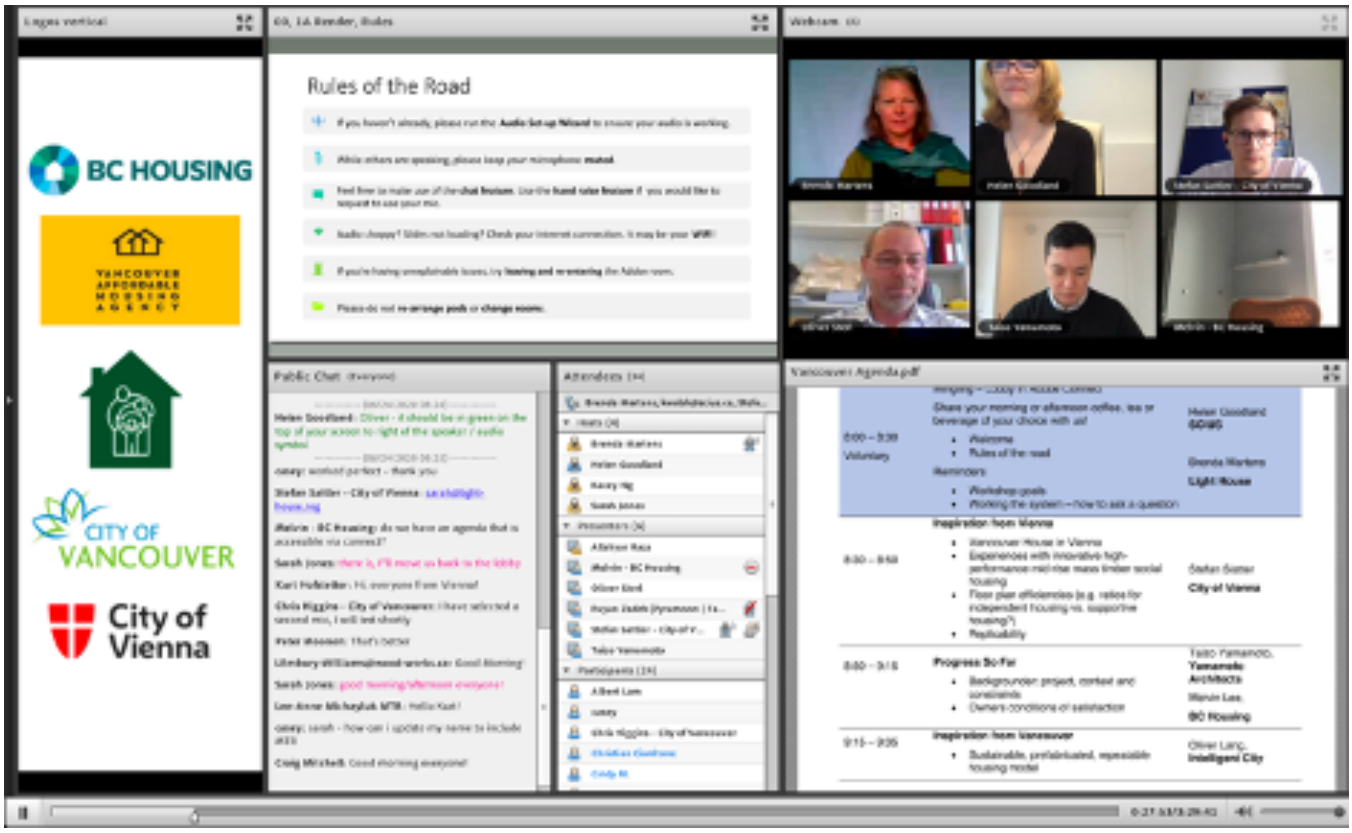
Objective	Measures/Methods/Features	Notes	Decision Rationale	Consensus	Action Item
Resilient Design	**Climate change considerations:** Solutions for 2020 or 2050 climate data. **Post-Disaster considerations:** › Include solutions using 100yr or 500yr data to predict storm water, noting roof water load capacity, leak prevention. › Soil erosion. › Identify "low hanging fruit" and provide passive measures to address effects of possible forest fire particulates on IAQ. i.e. Consider proximity to possible forest fire and duration. › Provide provisions for a seismic design, to render building habitable after a major earthquake. **Design Considerations:** Considerations to facilitate the reconfiguration of unit floorplan i.e. reconfigure from 1 bdr. to 2 bdr.	BC Housing Preference: BC Housing is doing Climate Adaptation in one project currently. Post-disaster consideration may be of interest, as a pilot project. CoV Preference: Contract should require Vienna House designed and built to 2020 climate file and capable of maintaining thermal comfort during high smoke events. Ask design team to also model to 2050 climate file and comment on design changes and high-level costs to either maintain thermal comfort through 2050 OR design changes to facilitate future retrofit for the same. If these are attractive, seek additional funds and change scope.	BC Housing : Some Climate Adaptation strategies are already part of BC Housing Design Guidelines including conditioned cooling inside residential units via central ventilation distribution. CoV: City priorities are on low carbon and affordable. Successfully transitioning to low carbon requires that buildings are more comfortable and have better IAQ than traditional building approaches.	**Led by Kenneth Gilbertson, VAHA** BC Housing has existing standards (BC Housing to provide): › Energy modeling and design considerations. › Climate adaptation is a BC Housing requirement. › Ensure design can maintain thermal comfort. › Reduce requirements to include highest priorities to ensure project stays on track. › Determine which climate data will be used. Establish requirements for wheelchair accessibility: › CoV require all units to be adaptable. › CoV and BC Housing require 5% of units to be wheelchair accessible. › CMHC requires 10%-15% of units to be wheelchair accessible to qualify for funding. Consensus target of 5% adaptability.	BC Housing to provide adaptation requirements. Determine core project requirements/ priorities. Determine which climate data will be used. BC Housing to provide current climate strategies.

The Workshop

The first Vienna House Workshop brought together 50 participants primarily consisting of the owner group (BC Housing, VAHA and More Than a Roof) with industry experts, policy makers and researchers from Vancouver and Vienna. Many participants were referred by the owner group from their respective team. A full list of participants, including experts and their specialty, facilitators, and note takers can be found in Appendix A. In anticipation of the workshop, participants were provided with a briefing package, consisting of an agenda and supplementary documents to provide additional contextual information for the workshop.

The workshop was organized into two segments: 1. information sharing and then 2. facilitated discussion. A screenshot of the Adobe Connect platform during the opening introduction is presented below.

Screen capture of the Adobe Connect platform



1. Information Sharing

Presentations were delivered from two experts in Vienna from the City of Vienna, the architect for Vancouver House in Vienna, the architect for Vienna House in Vancouver and an innovative turnkey housing provider in B.C.

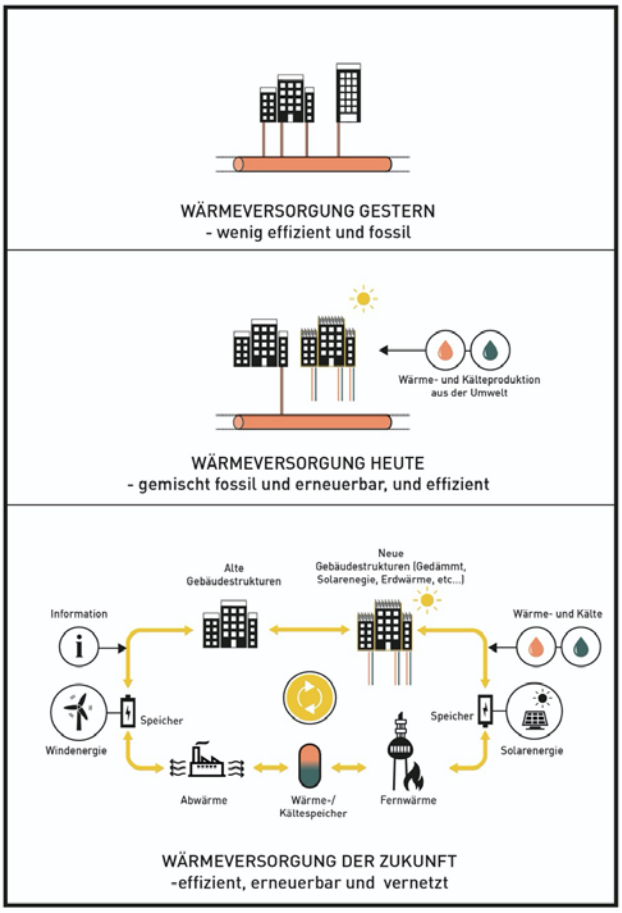
STEFAN SATTLER
Renewable Energy and Green Building Expert, City of Vienna

As Renewable Energy and Green Building Expert for the City of Vienna, Stefan provided an overview of the City's key characteristics and its policy goals related to climate change and housing. In particular:

- **Resource Conservation:**
  - Vienna lowers local greenhouse gas emissions per capita by 50 per cent by 2030 and by 85 per cent by 2050 compared to the base year 2005.
  - Vienna lowers local final energy consumption per capita by 30 per cent by 2030 and by 50 per cent by 2050 compared to the base year 2005.
- **Quality of Life:**
  - Vienna is the metropolis that offers the highest quality of life and life satisfaction in the world.
- **Innovation:**
  - Vienna will be an innovation leader by 2030.

Stefan included examples of how to reduce greenhouse gas emissions and energy consumption in Vienna to create an impact at the global scale.

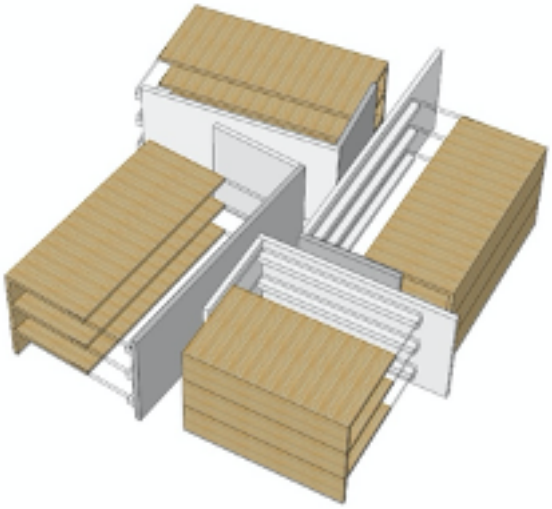
Diagram detailing the introduction of alternative forms of energy for the future in Vienna (courtesy Stefan Sattler, City of Vienna).



OLIVER STERL
Managing Director, Rüdiger Lainer + Partner

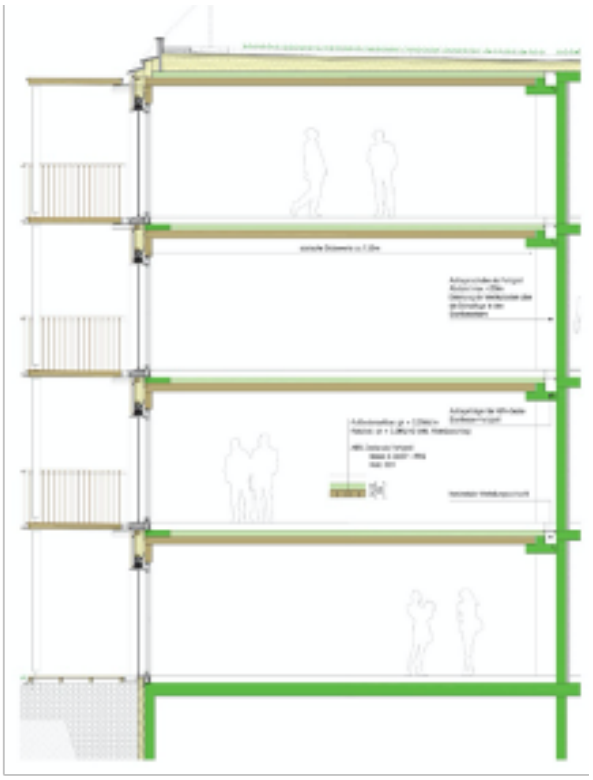
Oliver is the architect leading the design of the Vancouver House project in Vienna and a leading expert on mass timber and prefabrication. He presented approaches to, and benefits of, prefabrication and digital design. He noted the importance of considering sustainable options beyond minimum zoning regulations, as Vienna is being confronted with the increasing impacts of climate change. Vancouver House will consist of 107 rental units, a kindergarten, 12 units for assisted living, and 11 units for single parents, all in a hybrid wooden structure. Passive House level performance is required under the base building code in Vienna, so the building will be exceptionally energy efficient and low-emissions. Construction will begin in June 2022.

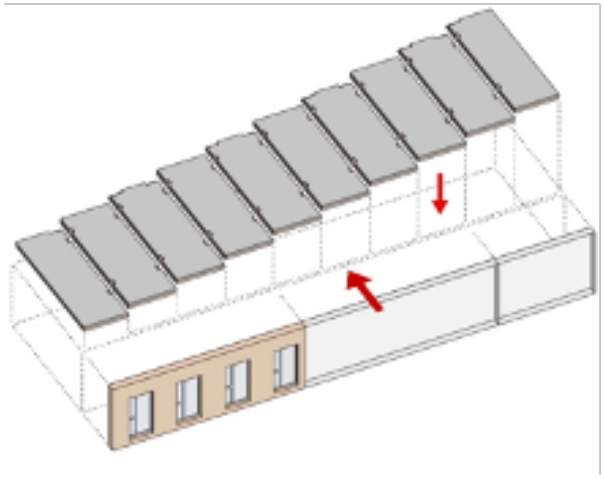
Interior and exterior renderings and massing diagram of Vancouver House in Vienna (courtesy Rüdiger Lainer + Partner)

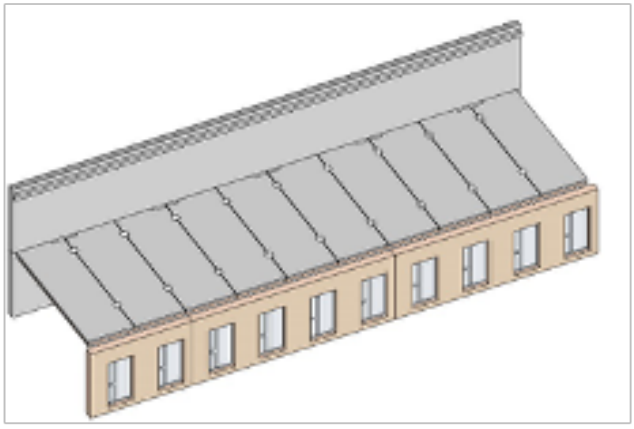


RLP won the Vancouver House design competition in 2019. The four storey, four building complex is situated in the 22nd district in Vienna, with mostly single-family zoning and small commercial spaces in the area. It utilizes a simple design whereby the mass timber structure, comprising CLT floors and walls with additional glulam columns, is organised around a central concrete core or “backbone”, which houses all the building services and technical infrastructure.

Schematic floor plans, section and construction assembly (not to scale) for Vancouver House in Vienna (courtesy Rüdiger Lainer + Partner)



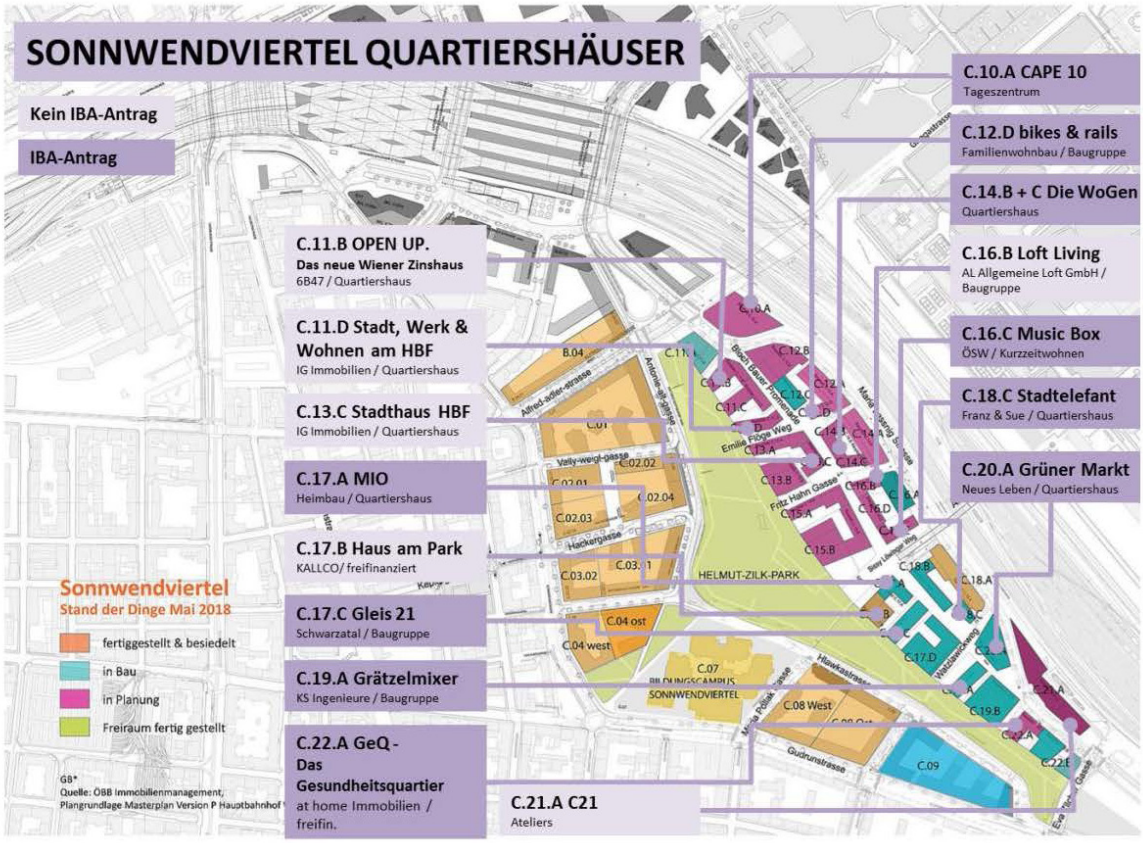




KURT HOFSTETTER
Senior Coordinator, International Building Exhibition, City of Vienna

Kurt leads social housing innovations in Vienna but also in other cities. With 115 showcase projects that include nine neighbourhoods and 15 single projects, the International Building Exhibition (IBA) brings together innovative ideas and new solutions with the intention of sharing leading practices in urban planning, housing and city making. Vancouver House is part of the program. Final results and built projects will be presented as well as discussed in 2022 – including site visits, conferences, etc. An exhibition titled “How will we live tomorrow?” will run from September 8 to October 22, 2020.

Plan for the 2022 Vienna International Building Exhibition (courtesy Kurt Hofstetter, City of Vienna)



Sixty per cent of Vienna’s citizens live in social housing and housing policy is rooted in the belief that housing should not simply be for the “poorest of the poor” but be considered “societal” by enabling a diversity of people living together. Income thresholds are used to determine eligibility. The City spends about €467 million a year (2018), of which 84 per cent is for capital investment - 52 per cent is for new buildings and 32 per cent for refurbishments. The funding is raised from long-term loans (57 per cent), federal housing subsidy 43 per cent and the rest comes from the City.

TAIZO YAMAMOTO
Principal, Yamamoto Architects

Yamamoto Architects prepared the preliminary project design of Vienna House for rezoning submission at the City of Vancouver (2019). The full rezoning submission set of drawings were available to the workshop participants. Taizo presented an overview of the current status of the project. He gave details of the current site to provide contextual information noting neighbourhood characteristics, proximity of the site to a Skytrain line, etc. During his presentation he provided an overview of the planning approach and explained how pre-fabrication could be applied to the construction approach.

Upper floor plan (not to scale), Vienna House (courtesy Yamamoto Architects)

Vienna House view from Stainsbury Avenue (courtesy Yamamoto Architects)

OLIVER LANG
CEO, Intelligent City

Oliver is the CEO of Vancouver-based Intelligent City and provided an overview of the award-winning turnkey approach his company is taking to address the future of housing. Intelligent City was founded with the mission to create highly integrated and adaptable, mixed-use housing systems. Their buildings combine high quality livability, enhanced affordability, advanced sustainability and community engagement into one consistent and adaptable solution. While requirements to reduce greenhouse gas emissions are rapidly increasing most developments offer little choice to meet the needs and desires of urban dwellers. Municipalities as well as private owners agree that community engagement, social interaction and connectivity are as necessary as adaptable buildings.

Intelligent City concept (sourced from the Lafarge-Holcim Foundation awards)

PRESENTATIONS

Links to the presentations provided to participants can be found here.

Presentation	Presenter	Link for Download
City of Vienna overview	Stefan Sattler	Link
City of Vienna and International Building Exhibition	Kurt Hofstetter	Link
Lainer Architects	Oliver Sterl	Link
Yamamoto Architects	Taizo Yamamoto	Link
Intelligent City	Oliver Lang	Link

Other supporting files for the workshop are available in a shared Dropbox folder.

2. Facilitated Discussion

The purpose of the workshop was to gather ideas for the forthcoming design procurement process by sharing information through:

- Room 1 – Timber Technology
- Room 2 – Lean, Pre-fabrication and Project Delivery Model
- Room 3 – Digital Strategy and Data

Adobe Connect allows participants to leave the main meeting area and to virtually "move" into break-out rooms. Prior to the workshop, participants were allocated into three separate rooms based on their expressed preferences made during the introductory tutorial session. Each room had a facilitator and a note taker as well as at least two subject matter experts and a representative from Vienna. After approximately 45 minutes of facilitated discussion, participants then reconvened in the main meeting room and were asked to vote on all items of importance in all rooms, not just the one they participated in.

Breakout Room 1

Assigned Topic: Timber Technology

This large group discussed the possibility of this project being designed with Mass Timber (MT) in mind, although the design has not yet been set. With guidance from technical experts, including Andrew Harmsworth (building code and fire engineering) and experts from Vienna, the discussion focused on the fact that the design was initially organized for modular / prefab but that if it is to be built using mass timber then there are specialized details that need to be considered. The following topics were discussed:

1. **Cost and business case for MT**

   Despite the strengths and limitations of MT, the cost case needs to make sense in order to determine which designs will work best for this project. Concrete was provided as an example of a construction material that is well understood. However, due to the lack of information and track record with MT, it is difficult to determine the cost projections. Participants asked whether there were ways to quantify the benefits to MT to level the economic cost of concrete. The group determined that cost is a major impediment to MT and more cost data is required.

   The group also agreed that more research on the key benefits of MT need to be explored with further case studies (i.e. speed of assembly, cost of materials, and hard costs). Cost effectiveness is crucial to make proforma make sense for non-profit development. Some benefits that were recognized with MT projects are that they are cleaner, quieter and require a smaller crew size.

2. **Speed of construction**

   The group noted that MT and prefabrication offer costs savings for the construction period while requiring increased design time at the current state of development. Some participants noted that that design cost may decrease as projects become more prominent. The group emphasized the importance to value the speed of construction which may provide lower cost overall in the form of months saved or costs of alternative housing options for future tenants. There is value in the time saved for future housing projects. From the provider's perspective, the time saved is great, but the capital cost is more of a determinant of choice of the structural system. The initial design was considered under temporary modular housing and now Vienna House is leaning more towards a permanent structure.

The group also wanted to consider ways to produce housing in a fast and effective way while working under City council's directions.

3. **Efficient and Sustainable Design**

   MT projects are considered the most costly than light wood frame (LWF) for buildings that are 5-6 storeys. The group was considering different hybrid options for the project. For a prefabricated building, LWF walls with MT floors would be economical. Another consideration would be a mix between LWF, MT, steel columns and MT floors. However, they noted that MT columns would take up building space and dig into the floor space ratio. Although British Columbia is an area where there are more benefits to building with wood or MT, it is not reflected in most costing models and should be addressed from policy rather than from the bottom-up.

   The group determined that this building needs to be able to provide lessons for the future for affordability by being transferable and replicable. This project should also take on the principals of Passive House for longevity and resiliency. Balancing these two themes must ensure, simultaneously, that this project still remains affordable for the tenants of the building.

4. **Suggestions for owner group in the RFP**

   Some suggestions were put forward for the owner group when creating the RFP. Mass customization needs to be explored. Lifelong sustainability of the building should allow for the building to last between 50-100 years. MT buildings should have protections against fire as the community wants safe buildings.

Breakout Room 2

Assigned Topic: Lean, Pre-fabrication and Project Delivery Model

Supported by a range of technical experts, including Craig Mitchell (modular building), Tom Plumb (Lean construction methods), Dr. Guido Wimmers (high performance prefabricated wood solutions) representatives from Wood Works! BC as well as experts from Vienna, this group engaged in a wide ranging discussion relating to construction delivery and the degree to which Canadian wood technologies are evolving to better deliver high performance buildings efficiently.

The most important point was that lowest cost and best value should be the goal – which takes into account operating costs over the building's life cycle, not necessarily the lowest price of construction. They suggested that the RFP and procurement should reflect this goal of seeking the best value. Furthermore, they suggested identifying the need in the community that aligns with the neighbourhood's design and compatibility and the return on investment for future investments by working with funding partners on funding cost frameworks.

"Lowest COST and best VALUE should be the goal, not lowest PRICE. they are not often the same and the RFP / procurement approach should strive for BEST VALUE."

"I think one of the obstacles to success for public owners is the interpretation of what is fair and transparent procurement. This often leads to the lowest price being the deciding factor."

The group emphasized the importance of lean construction and that early engagement would aid in creating positive reception to complex issues that can be solved with simple solutions. They suggested that a qualified team needs to be recruited to ease people towards prefabrication.

It was generally agreed that how the owner interprets "fair, open and transparent procurement process" will determine the success of the project – especially if it leads to the lowest price being the deciding factor for construction. Similarly, if the RFP is heavily weighted on fees, it may not result in the best proposal.

As a demonstration project with aspirations to use innovative wood technologies, prefabrication, digital project delivery and achieve very high levels of energy efficiency, the group mentioned that the market would view this project as different from a "business as usual" approach. This may mean that it could attract interest from firms that may not normally work on this type of project but could deter traditional respondents. The key factors relating to the innovation expected to be incorporated in this project should be clearly articulated in the RFP and contract details.

"Integration and timing are different from 'usual' approach, needs to be realized up front and written into contracts."

Among these details, the participants were concerned with how to create and sustain a collaborative project team culture and talked about how best to find the right people. There was discussion around integrated project delivery, but concern was expressed about the market's level of familiarity with this new method.

"If you pursue full IPD, some will have difficulty with shared risk / profit pool."

Other points that were noted include:

- Need to consider the City's zoning values; identify need in community, e.g. affordability; ROI for future investments; work with funding partners on funding cost frameworks, alignment with design; urban design and neighborhood compatibility
- Deconstruction should be considered
- How do you make sure target project goals are being achieved?

Breakout Room 3

Assigned Topic: Digital Strategy and Data

The topic for this group encompassed the role of digital technologies and process for designing, analysing, building and operating the building. A project that intends to use prefabrication extensively lends itself to digital project delivery methods. BIM experts, Scott Chatterton from AEOS Consulting and Geraldine Rayner from Summit BIM as well as Christian Cianfrone from ZEBx (an expert in zero emission building deisgn) helped guide the conversation and field technical questions related to digital tools and sustainability. The group also explored the types of data that could be developed on the project and the insights that this data might afford.

It was agreed that BIM is a powerful tool but not used to its fullest potential in the mid-rise wood frame housing category in B.C. If BIM is to be deployed on this project, the requirements must be included in the RFP process for all consultants and the builder. It needs to be clearly understood that the data is going to be shared across the project team and with the research group on a real time basis.

They noted that the information that is needed to operate and maintain the finished building should be developed in the BIM model as a "virtual twin." This will serve as "as-built" conditions and ease the handover process.

It was proposed that information can be developed and analysed in the BIM model that can help manage and sustain the building in the event of a severe weather or smoke event (e.g. passive energy sources or cooling). Participants also suggested

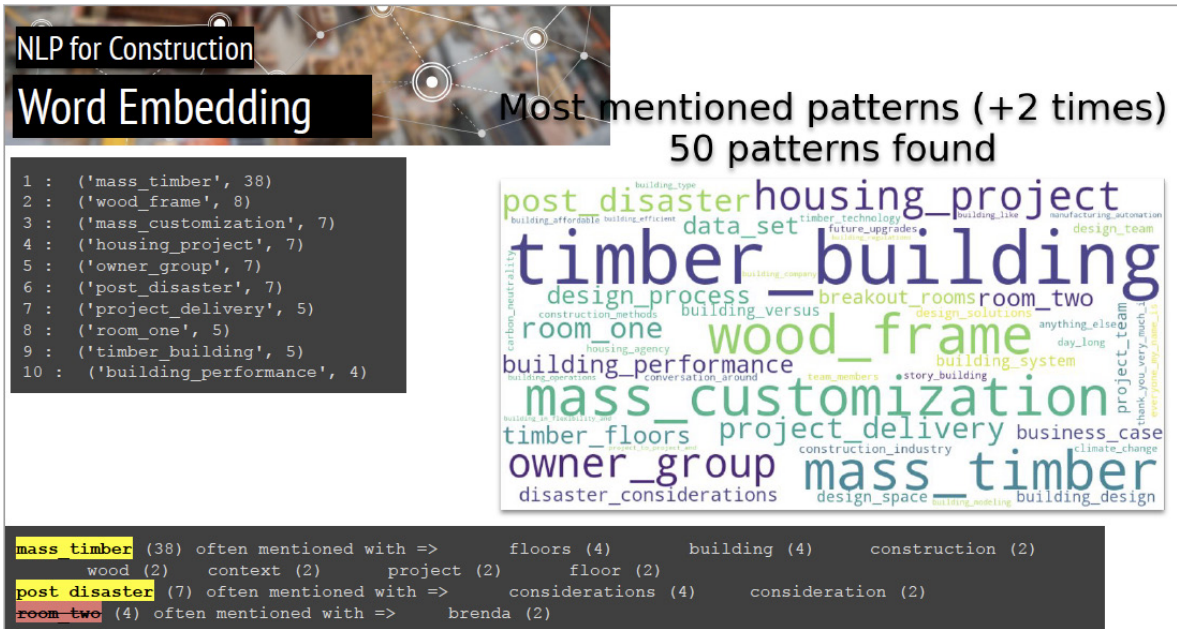
that flexibility needs to be incorporated into the design to address future upgrades that may be required as a result of climate change or smoke from wildfires.

"Make building information available for de-construction (future proof data)."

Further Analysis

To assist with documenting the workshop, notetakers made audio recordings of the conversations. While these recordings were only for data collection purposes, they offered an opportunity for further analysis. Each of those recordings were compiled and sent to Dr. Puyan Zadeh of Pyramoon Innovations. The analysis provides early insights into some of the concepts that emerged from the initial conversation.

Word frequency analysis of workshops (Pyramoon Innovations)



Considerations for further research, information gathering

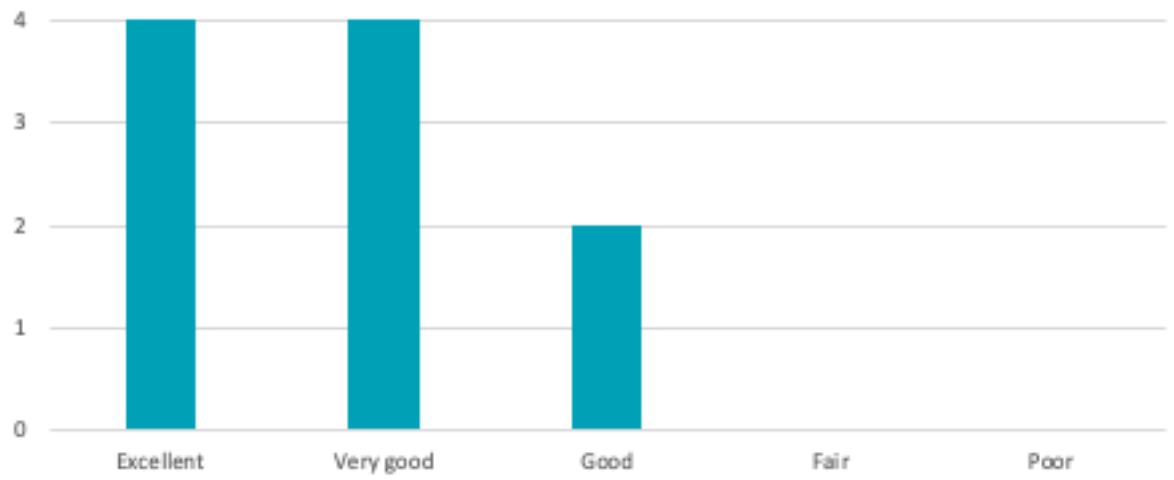
The following information was identified as lacking and would be important to decision-making for this project. Some (if not all) does not exist in the Canadian context so it opens up important opportunities for future research. Key topics include:

- Cost information for mass timber compared to LWF and concrete
- Case studies of prefab LWF / MT hybrid (such as the Adera approach)
- Template language for how to include BIM in the RFP process
- Examples of project KPIs to illustrate how to benchmark and value benefits of prefab such as time saved

Participant Feedback

At the end of the workshop, participants were asked to complete an online survey. There were ten responses (25 per cent response rate), all of whom felt the workshop was "good", "very good" or "excellent."

Summary of participant feedback on the workshop (n = 10)



Participants shared that the Adobe Connect platform provided a positive, accessible experience.

The feedback highlighted areas for further improvements as well. Some participants had trouble with audio on Adobe Connect, as it was their first time using the program. In particular, they noted that presenters were being cut off during their presentations, making them difficult to understand.

Participants are interested in the future of mass timber in British Columbia. In their comments, some participants expressed interest in discussing the design considerations for mass timber construction. This includes whether materials can be sourced locally, risk analyses, and working with operators to create housing designs with future tenants in mind. Other comments demonstrated an interest in including support for operators in terms of financing options and other known constraints for building with mass timber. Finally, other comments pointed to an interest in the long-term sustainability of these buildings and how to source replacement components.

Participants ended the survey with enthusiasm and excitement for the future of the project. One participant noted that mingling after the event should be held on Adobe Connect as they had experienced some issues with the subsequent Google Hangout virtual reception.

Appendix 1: Workshop Agendas

1. Workshop Tutorial and Introduction to IDP

Thursday June 18, 2020 Vancouver: 8:00 – 9:00am PST / Vienna: 5:00 – 6:00pm GMT+2

Time	Item	Facilitator
8:00 – 8:10	**Welcome**	Helen Goodland, **SCIUS**
8:10 – 8:25	**Introduction to Adobe Connect** › Introductions to conference platform › Tutorial activities › Participant introductions › How to ask a question › What to bring to the session	Sarah Jones, **Light House**
8:25 – 8:35	**Project Introduction** › Two City welcome › Affordable housing project objective › Objectives of the Vienna House demonstration initiative	Chris Higgins, **City of Vancouver** Stefan Slatter, **City of Vienna** Lee-Anne Michayluk, **More Than a Roof** Melvin Lee, **BC Housing**
8:35 – 8:45	**Workshop Series – Overall Goals** › Purpose and goals of Workshop 1a › Procurement pathways to innovation › Strategies to inform the project team selection process › Pre-selecting your break-out room	Helen Goodland, **SCIUS**
8:45 – 8:55	**Reframing the Goals** › How to ask the question	Brenda Martens, **Light House**
8:55 – 9:00	**Questions**	

2. IDP Workshop No. 1 Agenda

Wednesday June 24, 2020 Vancouver: 8:30 – 11:30am PST Vienna: 5:30 – 8:30pm GMT+2

Time	Item	Facilitator
8:00 – 8:30 Voluntary	**Mingling – Lobby in Adobe Connect** › Welcome › Rules of the road **Reminders** › Workshop goals › Working the system – how to ask a question	Helen Goodland, **SCIUS** Brenda Martens, **Light House**
8:30 – 8:50	**Inspiration from Vienna** › City of Vienna policies and priorities › Vancouver House in Vienna › Experiences with innovative high-performance mid-rise mass timber social housing › Floor plan efficiencies (e.g. ratios for independent housing vs. supportive housing?) › Replicability	Stefan Slatter, **City of Vienna** Kurt Hofstetter, **City of Vienna** Oliver Sterl, **Rüdiger Lainer + Partner**
8:50 – 9:15	**Progress So Far** › Backgrounder: project, context and constraints › Owners conditions of satisfaction	Taizo Yamamoto, **Yamamoto Architects** Melvin Lee, **BC Housing**
9:15 – 9:35	**Inspiration from Vancouver** › Sustainable, prefabricated, repeatable housing model	Oliver Lang, **Intelligent City**
9:35 –9:45	**Break**	
9:45 – 9:50	**Break-out room instructions:** › Defining state-of-the-art solutions and practices › Validate project goals › How does Vienna do it? › Developing workable solutions for selecting the project team › Document everything on the whiteboard › Be ready to report out the top two issues	Brenda Martens, **Light House**

Time	Item	Facilitator
9:50 – 10:35	**Room 1 –Timber Technology** › Standardization v customization (shifting the design mindset) system design and kit of parts › Mass timber v hybrid systems › Fire and insurance considerations › Wood design considerations - seismic resilience, acoustics, etc.	**Facilitator:** Helen Goodland
	Room 2 – Lean, Pre-fabrication and Project Delivery Model › Defining best value › Predictability and reliability › Fair, open and transparent procurement process. › Helping the market respond › Collaborative strategies › Picking the team › Early onboarding of construction team	**Facilitator:** Dr. Puyan Zadeh
	Room 3 – Digital Strategy and Data › Building Information Modelling (BIM) › Managing the "Golden Thread" of information › Climate strategy and resilience– 2050 data? › Implications on: › Permit processing › Fabrication › Hand-over and asset management	**Facilitator:** Brenda Martens
10:35 – 10:40	**Break**	
10:40 – 10:55	**Breakout Room Review** › Participants vote on discussed themes	Brenda Martens, **Light House**
10:55 – 11:25	**Debrief – Top 2 issues (submit the rest as a list)** › Bringing together findings from the break-out rooms – Lessons for the RFP and project delivery processes › Trade-offs › How should the relationship between Vancouver and Vienna develop?	All

Time	Item	Facilitator
11:25 – 11:30	**Wrap up – Summarize Next Steps** › Summary report of findings to owner group › Date of next meeting – end of July › Final comments	Helen Goodland, **SCIUS**
11:30 – 12:00 Voluntary	**Networking** The platform will stay open for further conversations.	

Appendix 2: Participant List

Name	Position / Expertise	Organization
Denisa Ionescu	Research Centre	BC Housing
Melvin Lee	Development Manager	BC Housing
Steven Chan	Project Technician	BC Housing
Michael Lachocki	Procurement	BC Housing
Karine Akopova	Procurement	BC Housing
Quang Tran	Procurement	BC Housing
Remi Charron	Research Centre	BC Housing
Ren Bai	Construction Services	BC Housing
Sadia Afrin	Construction Services	BC Housing
Kira Pederson	Energy and Sustainability	BC Housing
Casey Wickham	Operator/Owner	More Than A Roof
Lee-Anne Michayluk	Operator/Owner	More Than A Roof
Mark Simpson	Project Manager	VAHA
Allahyar Raza	Development Manager	VAHA
Heather Oland	Senior Development Manager	VAHA
Chris Higgins	Green Building Planner	City of Vancouver
Andrew Matterson	Supply Chain Management	City of Vancouver
Experts from Vienna		
Kurt Hofstetter	International Building Exhibition	City of Vienna
Stefan Sattler	Energy Efficiency / Passive House	City of Vienna
Oliver Sterl	Architect of the Vancouver House, Mass Timber Expert	Rüdiger Lainer + Partner Architekten ZT GmbH
Subject matter experts		
Taizo Yamamoto	Project Architect	Yamamoto Architecture
Jennifer Leung	Architecture Intern	Yamamoto Architecture
Oliver Lang	CEO	Intelligent Cities

Name	Position / Expertise	Organization
Christian Cianfrone	Executive Director, Zero Emission Building Design expert	ZEBx
Pedram Faghani	Technical Manager	Wood WORKS! BC
Andrew Harmsworth	Code Consultant	GHL Consultants Ltd.
Guido Wimmers	Head of the Masters in Wood Engineering and Design	UNBC
Scott Chatterton	BIM, Digital Strategy	AEOS Consulting
Geraldine Rayner	BIM FM and Digital Hand-over	Summit BIM
Craig Mitchell	Modular Construction Expert	Black Box Modular Solutions
Tom Plumb	CEO and Head of CCA Lean Construction Industry Community of Practice BC	Kinetic Construction
Lynn Embury-Williams	Executive Director	Wood WORKS! BC
Peter Moonen	National Sustainability Manager, Canadian Wood Council	Wood WORKS! BC
Sukh Johal	Technical Advisor, BC Mid-rise Technical Lead	Wood WORKS! BC
Observers		
Jieying Wang	Senior Scientist - Durability and Sustainability	FPInnovations
Nina Dmytrenko	Researcher	CMHC
Mohammad Mohammad	Senior Research Advisor	NRCAN/RNCAN
Kika Mueller	Junior Program Officer	NRCAN/RNCAN
Julie Tourrilhes	Junior Program Officer	NRCAN/RNCAN
Research, facilitation and support		
Helen Goodland	Workshop Co-facilitator	SCIUS
Brenda Martens	Workshop Co-facilitator	Light House
Sarah Jones	Adobe Connect Hosting	Light House
Angelique Pilon	Director, Urban Innovation Research, Project Documentation	UBC
Devarsh Bhonde	Researcher	UBC
Puyan Zadeh	Researcher	Pyramoon Innovations
Kelly Walsh	Documentation and Reporting	SCIUS
Albert Lam	Documentation and Reporting	SCIUS
Kacey Ng	Documentation and Reporting	SCIUS

Appendix 3: Documents List

All listed documents are available on Dropbox.

Project information (Rezoning Package)
Breakout Room Allocation
BC Housing Research Centre Overview
BC Housing Live Green Sustainability Report
BC Housing Sustainability Procurement Policy
BC Housing Research Education
BC Housing and City of Vancouver Objectives for Vienna House
Business Planning Cycle
2018 Design Guidelines and Construction Standards
BC Housing Sustainability Policy
Subsidized Rental Housing Program Framework
Video: Does Vienna Have the World's Best Council Housing?
Video: Could London learn from Europe?
The Tyee: How Vienna Cracked the Case of Housing Affordability
Kurt Hoffstetter Presentation – City of Vienna
Stefan Sattler Presentation – City of Vienna
Oliver Sterl Presentation – Rüdiger Lainer + Partner
Taizo Yamamoto Presentation – Yamamoto Architects

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