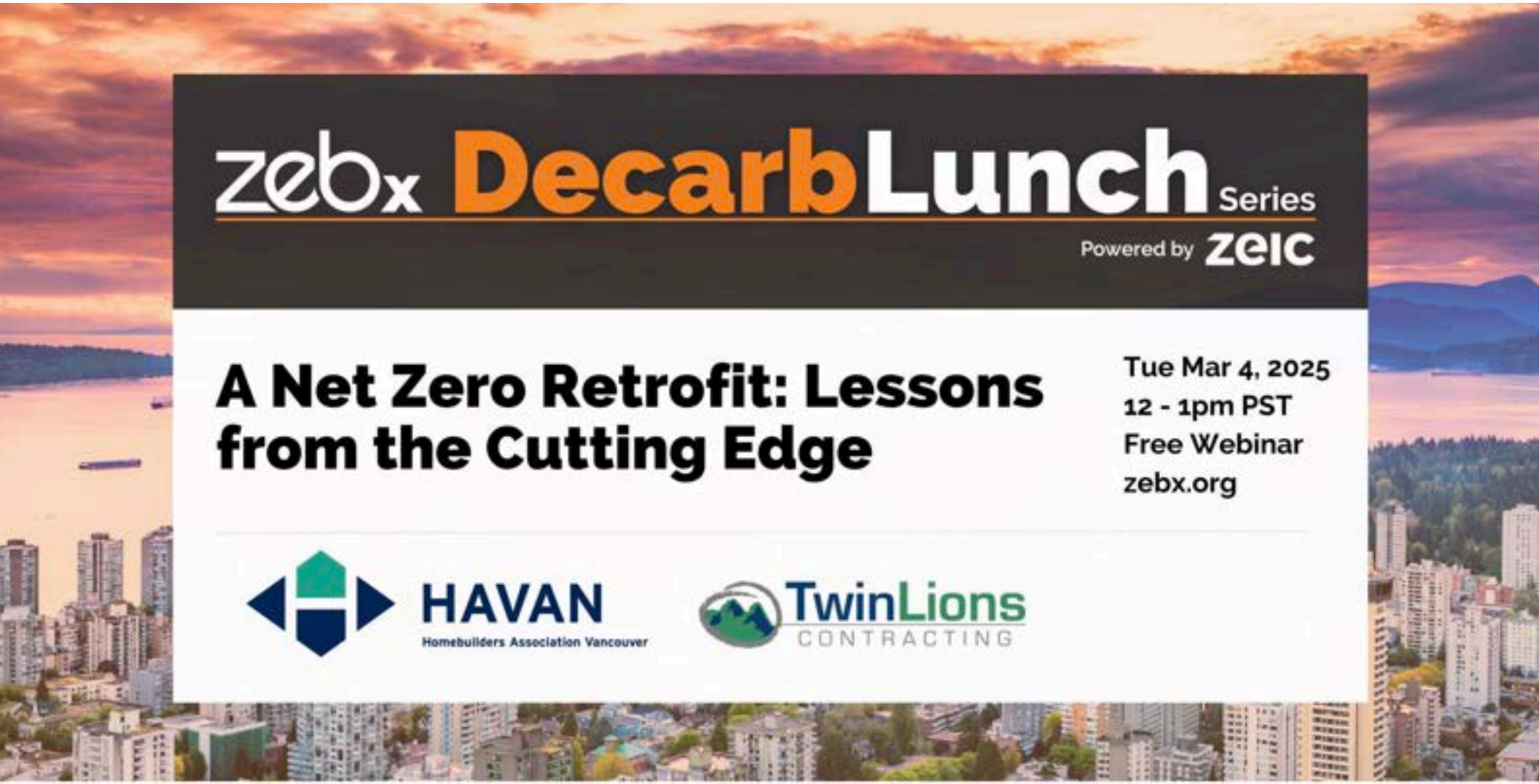


CITY OF VANCOUVER BC Hydro Vancity

HAVAN

Homebuilders Association Vancouver

A Net Zero Energy Retrofit

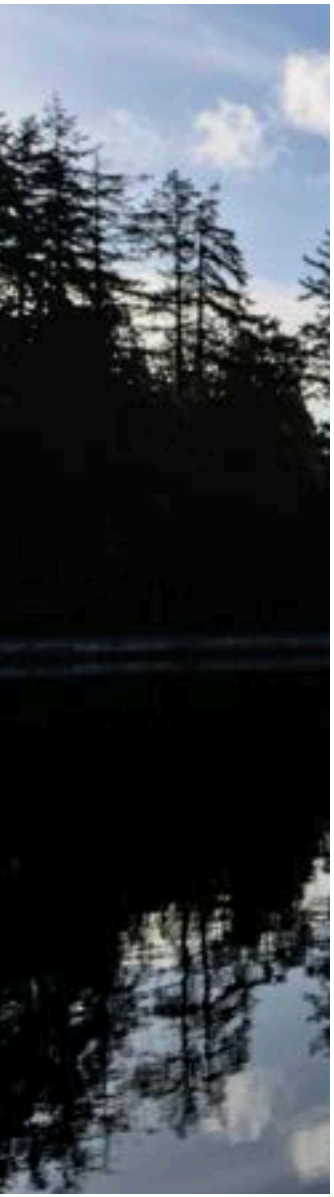
Lessons from the Cutting Edge

ZEBx Decarb Lunch - Tuesday March 4th, 2025

HAVAN | Homebuilders Association Vancouver

TwinLions CONTRACTING

zebx



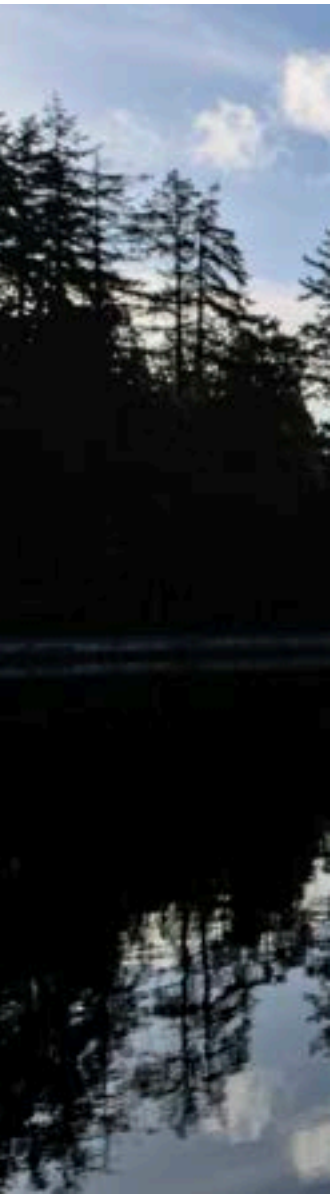
Presenters

Kevin Hatch

Co-owner / President, Twin Lions Contracting

Zosia Brown

Homeowner / Sustainability Consultant



Outline

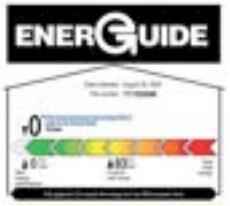
- Project aspirations and wins
- Living in a net zero house
- Sustainable design features
- Challenges and lessons learned
- Policy recommendations
- Discussion

Project aspirations

1958

2024

Project wins



- Net zero energy design and all-electric goals met
- CHBA NZE certified renovation (North Shore's first), one of four in BC
- Air tightness improved from 9.37 ACH to 1.08 ACH
- Energy consumption down 80% 185GJ/yr to 38 GJ/yr; 8TCO2/yr to zero!
- 110% energy expected to be generated onsite from solar
- Embodied carbon ~40% less than City of Vancouver average @ 120 kgCO2e/m2
- Lots of products out there to support NZE

Living in a net zero energy house

Living in a net zero energy house

- 5 more years of living in the original home @8TC02 per year = the embodied carbon cost of the rebuild. Timelines have huge carbon and cost implications.

TIMELINE

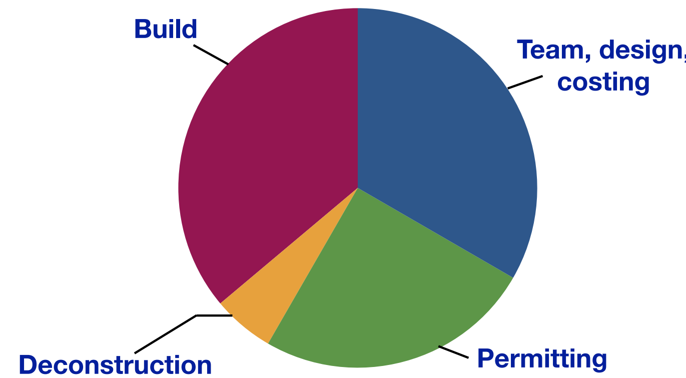
2021 --> **2024**

- **May 2021**
  Purchased home
- **July 2021**
  Closing / keys
- **Nov 2021**
  First set of drawings
- **Feb 2022**
  Schematic drawing package for costing
- **March 2022**
  Contractor Class C Estimate; Reiteration
- **April 2022**
  Pause & Project team restructure

- **June 2022**
  Building Permit Submission #1
- **July 2022**
  Building Permit Revised Submission #1.2
- **Oct 2022**
  Building Permit Issued!

Breakdown of time spent per activity

- Team-building, design & costing ~1 year
- Permitting ~9 months
- Deconstruction ~2 months
- Build ~13 months



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- **Dec 2022** Deconstruction & abatement complete

- **Jan 2023** Decision to add to basement height
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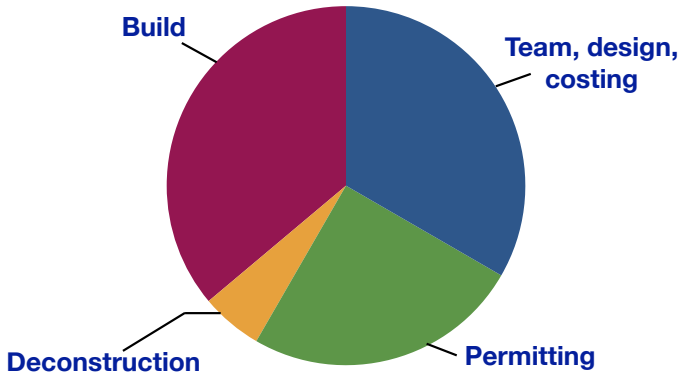

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- **July - Dec 2023** Foundation upgrades, framing, new roof
- **Jan - Feb 2024** Triple pane window install, air barrier, interior framing
- **March 2024** Mechanical, electrical, plumbing; Lock-up
- **April - May 2024** Insulation, drywall, solar install
- **June - July 2024** Flooring and finishes
- **Dec 2024** Post-construction boulevard sign-off
- **Aug 2024** Permeable driveway & hardscape
- **Sept 2024** Final inspection & handover; Move date

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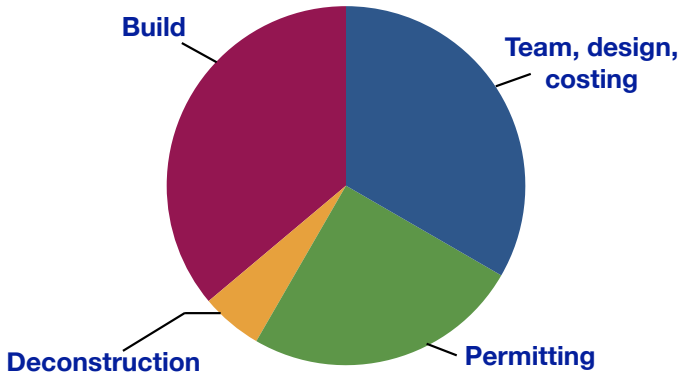

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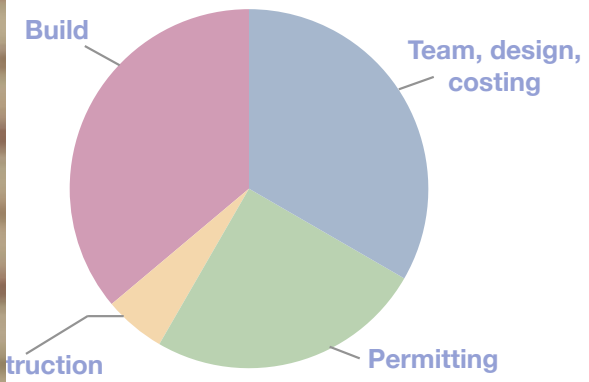


Sustainable design features

Deconstruction

- 80% diversion of waste from landfill with Unbuilders / Heritage Lumber
- Repurpose ~**4540 board feet** in rebuild
- Reuse of bulk of foundation = 9 tonnes CO2 or 30% embodied carbon of home

Sustainable design features

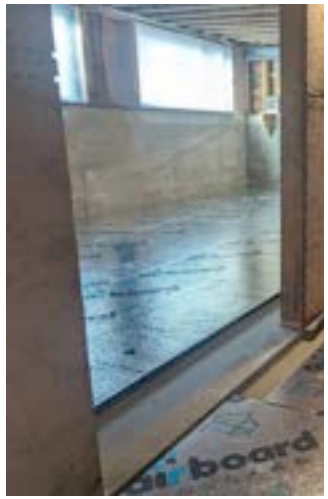
Low-carbon concrete

- Rempel Bros Heidelberg 32 MPa Silver Superline Mix @ **194 kgCO2/m3**
- ~30% reduction vs BC baseline
- ~50-70% vs Canadian ready-mix concrete baseline

Sustainable design features

Triple glazed windows and Insulation

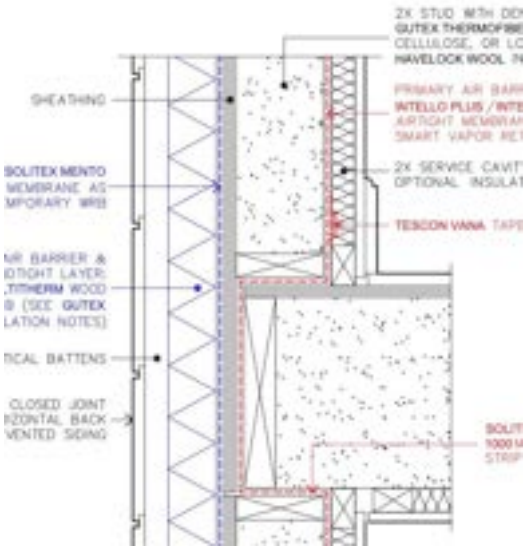
- Single —> Vinyltek triple glazed windows
  - **USI 0.97-0.91**, SHGC 0.16-0.19
- Insulation increased from:
  - 0 —> **R22** (basement)
  - R8 —> **R24-28** (walls)
  - R24 —> **R60** (attic)
- No sub-slab insulation because kept original foundation



Sustainable design features

Air tightness

- Air tightness improved from 9.37 ACH to **1.08 ACH**
- Exterior air/vapour barrier (Mento 1000) at basement
- Interior air/vapour barrier (Intello Plus) main floor —> ceilings



Sustainable design features

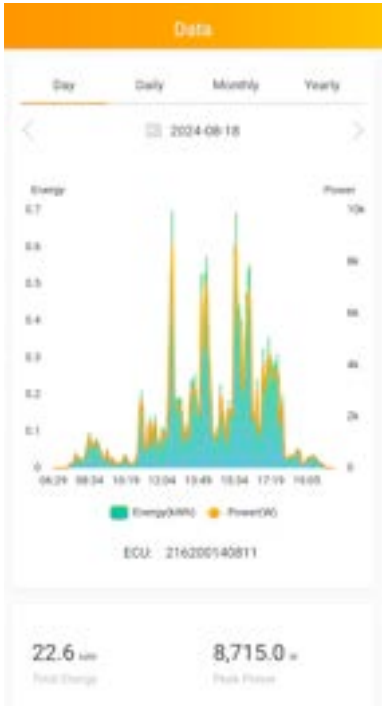
Cold climate heat pump & heat pump hot water

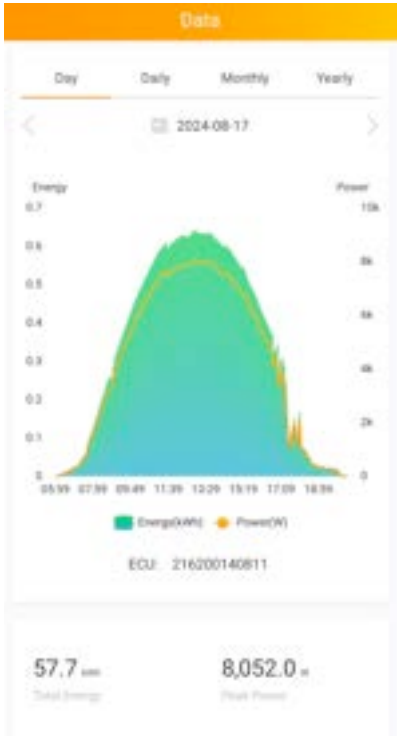
- **3 Ton Carrier** cold climate air source heat pump
- Rheem **hybrid electric heat pump** hot water tank, UEF 4.07

Sustainable design features

Solar array

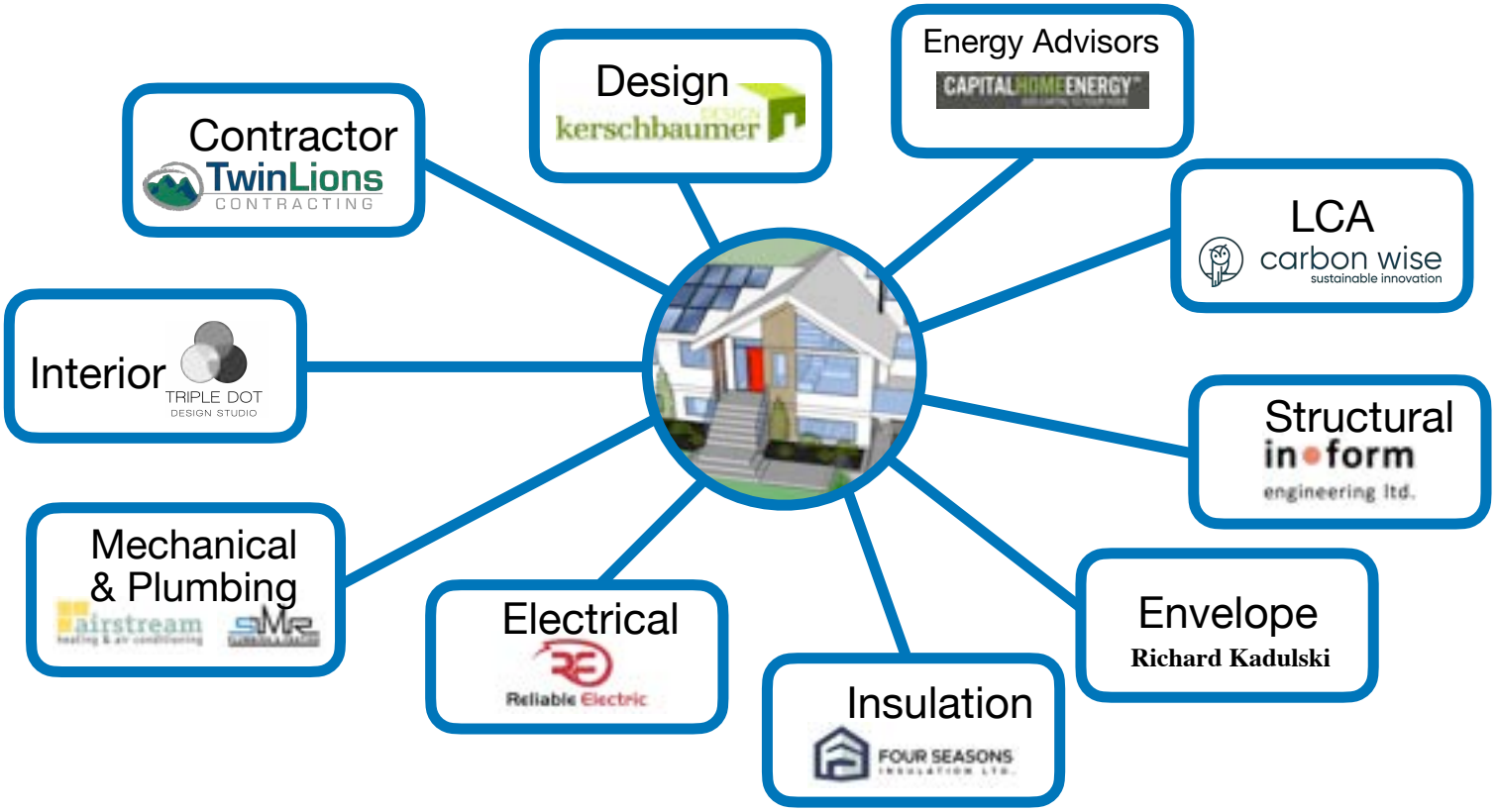
- 27 panels, 570 sqft array installed with Pure Solar
- ~**11-12MWh** estimated annual production





Challenges and lessons learned

Feedback loops for NZE design need improvement



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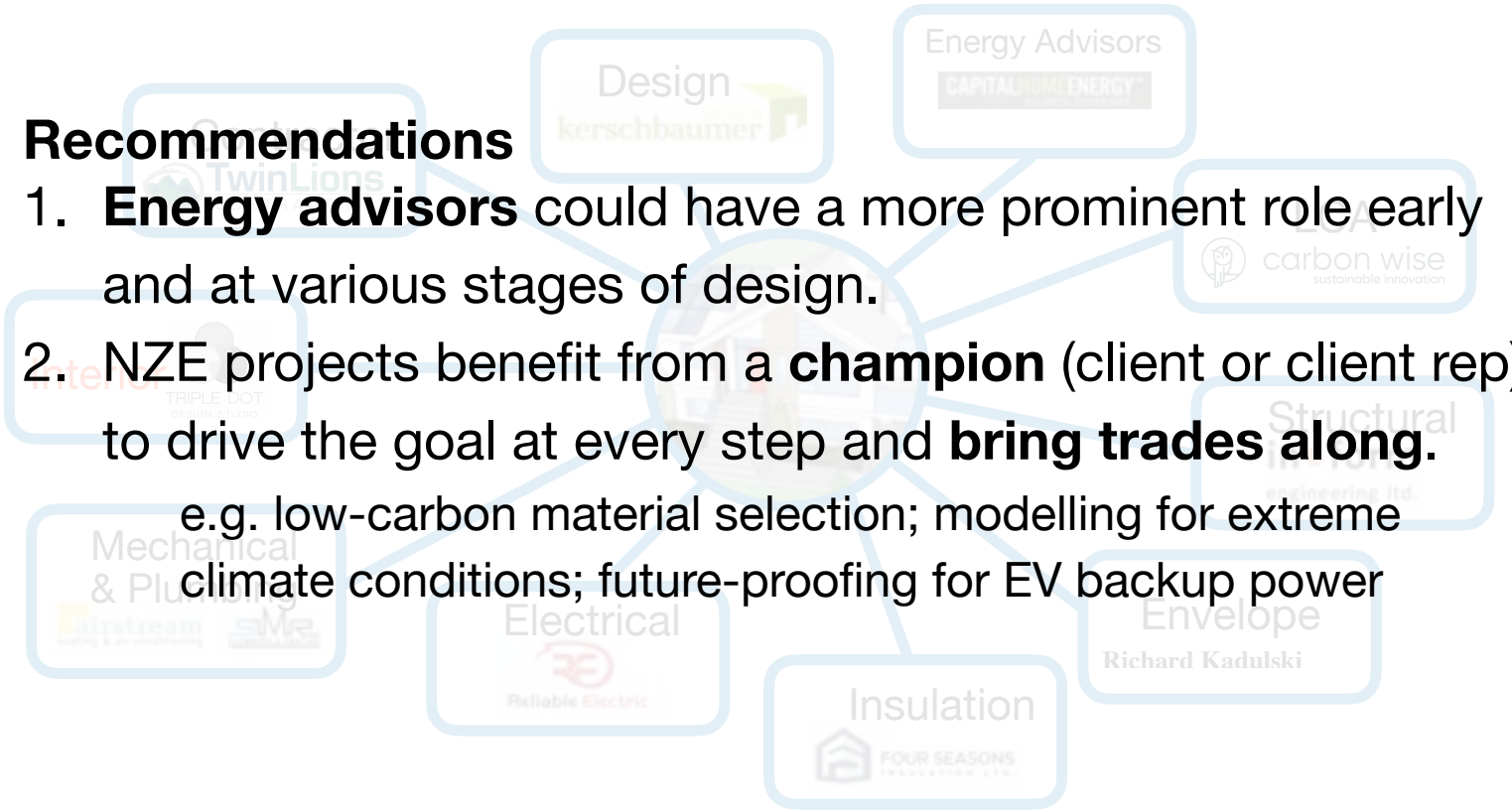

Recommendations

1. **Energy advisors** could have a more prominent role early and at various stages of design.
2. NZE projects benefit from a **champion** (client or client rep) to drive the goal at every step and **bring trades along**.
   e.g. low-carbon material selection; modelling for extreme climate conditions; future-proofing for EV backup power

Challenges and lessons learned

Incentives change behaviour. Make it easier though!

BRITISH COLUMBIA | cleanBC BETTER HOMES

Municipal Top-Ups

CityGreen × Vancity

FORTIS BC™

Request natural gas service removal

Challenges and lessons learned

Incentives change behaviour. Make it easier though!

Recommendations

1. **Work with energy advisors,** the design community and owners in designing rebates.
2. **Align rebate systems** across energy providers so it's just as easy to get rebates for an electric heat pump as dual fuel.
3. Allow **trades to access decarb incentives** on behalf of owners, handle the paperwork, and package with their products!

Challenges and lessons learned

Foundation reuse is hard

Challenges and lessons learned

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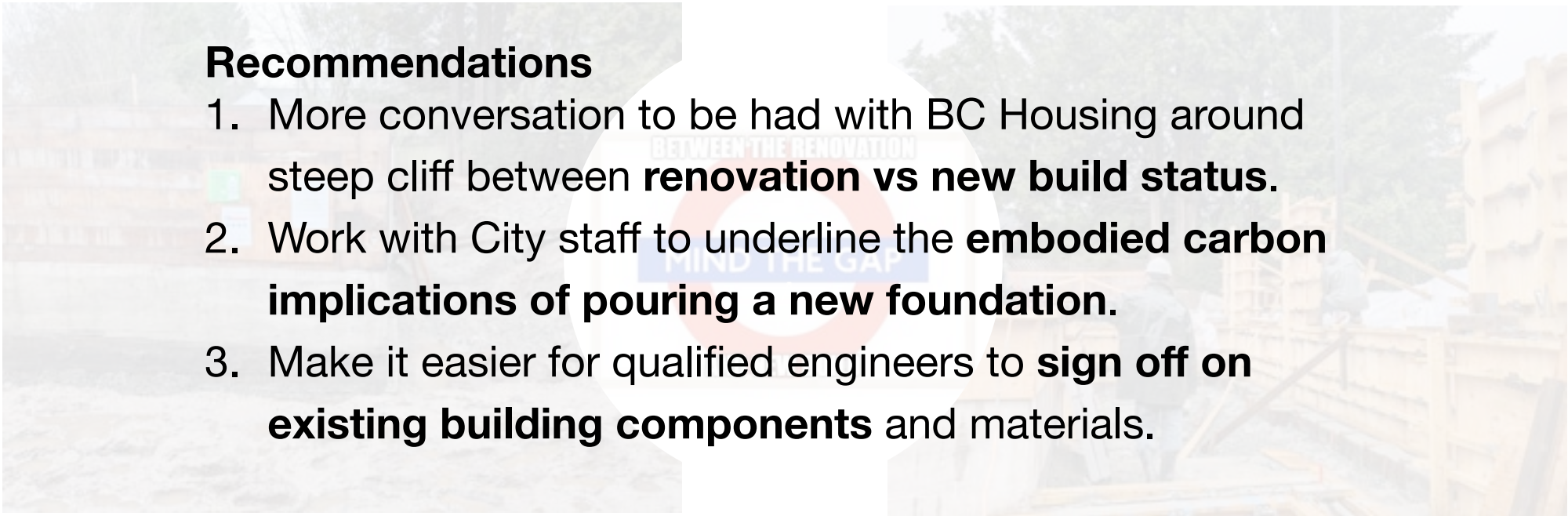
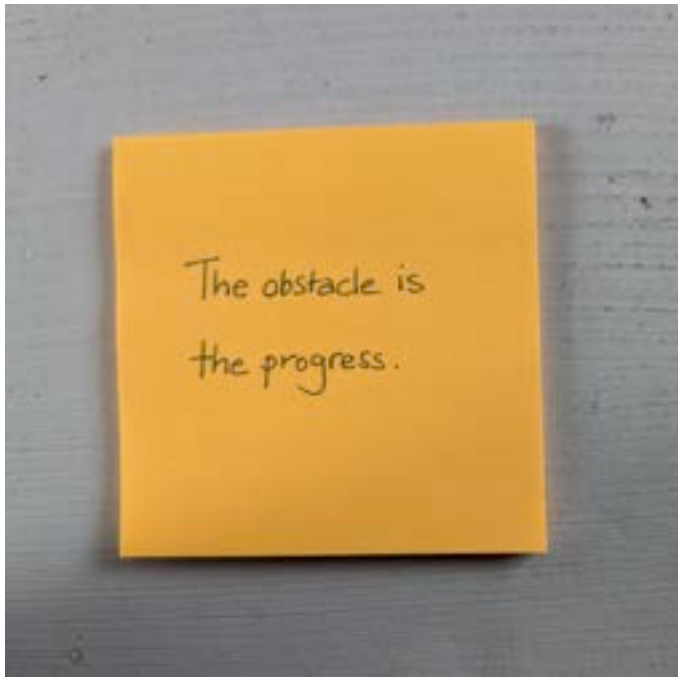


Recommendations

1. More conversation to be had with BC Housing around steep cliff between **renovation vs new build status.**
2. Work with City staff to underline the **embodied carbon implications of pouring a new foundation.**
3. Make it easier for qualified engineers to **sign off on existing building components** and materials.

Challenges and lessons learned

Permitting hurdles are inevitable, but must they be?



Challenges and lessons learned

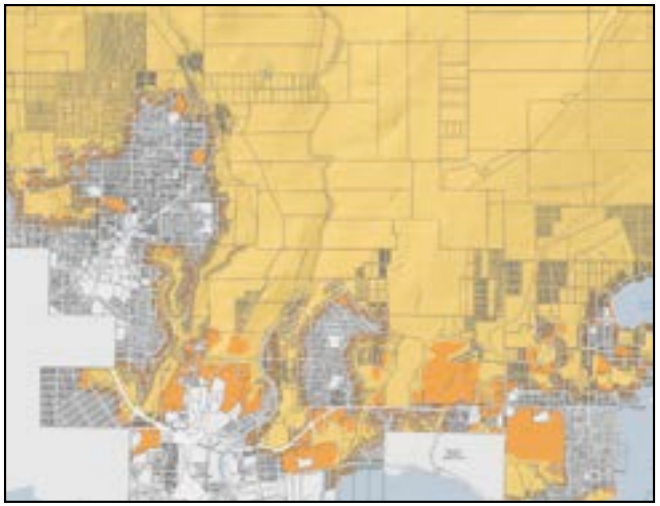
Permitting hurdles are inevitable, but must they be?

Recommendations

1. Can building departments look for ways to improve their processes, **accelerate timelines/FSR for step-code progressive projects**?
2. Community **crowd-sourcing** via ZEBx (e.g.) People who have just experienced the process are the best to get information from.

Challenges and lessons learned

Wildfire requirements are well-intended but blunt in application

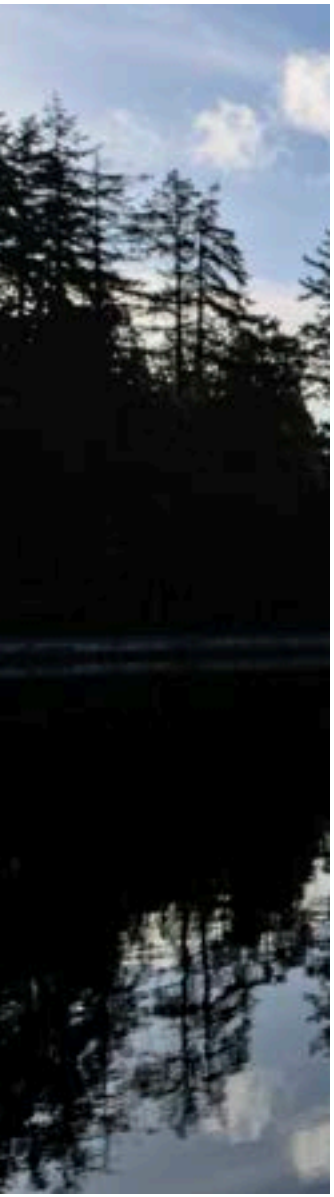


Challenges and lessons learned

Wildfire requirements are well-intended but blunt in application

Recommendations

1. Wildfire designation and **process should be made more clear** at permit issuance.
2. Further **training and education** needed for architects, builders, city permitters and consultants, and leniency applied in the meantime.
3. Can wildfire measures for major renos and new builds be **paired with stronger community measures**?



Summary

- Form and architecture are very important in getting a renovation to NZ because of lock-in of early design decisions.
- Integrated design is paramount; feedback loops need improvement.
- Lots of products out there to support NZE, someone needs to push for it and bring sub-contractors along in the process.
- Could trades own/supply energy efficiency rebates?
- Permitting hurdles have serious time/cost/carbon outcomes. Improved coordination and support of code-progressive projects may help.
- Many paths to net zero or nearly NZ. Upgrades (e.g. heat pumps, triple glazed windows, solar) can be done without an entire rebuild and much cheaper.

Discussion

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zebx