Phased Retrofits–Large Buildings Lab Insight Brief
Reimagine Buildings Collective–SUMMER 2025

Phased Retrofits–Multifamily + Large Buildings Lab

Lab Members: *Debbie Chambers, Sandra Lester, Buck Moorhead, Marin Nagle, Dori Renelus, Nidhi Shah, and Kurt Waldenberg*

Futureproof Phased Retrofits
Conscientiously going beyond Passive House

Challenge

Every building is different and we don't know what will work until we do a deep dive. We can take the customer through a process, but we have to go through customized renovation.

Top Takeaways

We need to use a process to determine which upgrades need to be done when:

1. **Assess the goals, needs, facts and funding drivers.**

   Goals:
   - Determine the customer's top three to five drivers (energy is not usually the most important).

   Needs:
   - Determine the restrictions on the project (whether tenants can remain in place, what permits are required, which upgrades are necessary while renovating).
   - Determine which upgrades are necessary to make the building more

climate resilient (fire, earthquake, cold snaps and heat waves).
- Assess upgrades to allow for greater quality of life (thermal comfort, air quality, accessibility and ageing-in-place).
- Investigate restoration of the local ecosystem (wetlands, habitat for wildlife).

Facts:
- Assess the existing building condition including mechanical equipment, lighting, building envelope, electrical capacity, and list deferred maintenance issues.
- Gather utility data and benchmark the building.

Gather requirements for all funders:
- Operational savings
- Carbon footprint or Greenhouse Gas Intensity (GHGI):
- Passive survivability
- Other upgrade requirements (accessibility, fire etc.)

2. **Determine which products and technologies are available in your geographical area:**
    - PH-Certified building envelope components
    - Mechanical equipment
    - Heat Pumps
    - Ventilation equipment
    - Lighting

3. **Use energy modelling to determine the effectiveness of individual and bundled ECMs**

4. **Create a whole-building retrofit plan:**
    - Look for opportunities for carbon savings, energy savings and indoor air quality improvements that are low-hanging fruit first, then go deeper
    - Assess both the building owner's and the tenants' drivers:
        - How can we plan a better renovation?

- Air quality issues:
    - indoor air contamination from cooking
    - infestation issues
    - high CO_2 levels
- Operational costs (rarely)
- Carbon impact (rarely)
- Ageing building envelope or mechanicals (or both)

- Assess opportunities interventions for opportunities and issues:
  - Building code (fire dampers, fire ratings)
  - Maintenance issues (multiple equipment rather than centralized)
  - Building envelope performance (thermal bridging, air permeability)
  - Embodied carbon (biobased, local)
  - Climate resiliency
    - Wildfire
      - material flammability
      - filtering out <PM 2.5 contaminants
      - blocking embers
      - air sealing
    - Overland flooding
      - locating mechanicals above the 500-year flood levels
      - flood gates on underground parking garages
    - Drought (xeriscaping)
    - Powerful wind (mechanical fastening of PV panels instead of ballasted)
    - Increase risk of earthquakes (structural upgrades during building envelope renovations)
    - Cold snaps and heat waves (Passive House does well in this regard)
  - Accessibility, indoor air quality and ageing-in-place:
    - Engage with tenants to find out their needs
    - Go beyond code for accessibility, ageing-in-place and dementia
    - Bring in real samples before finalizing design (controls, operable window hardware, thermostats, HVAC system controls, exit door hardware)

    - Regenerative design (based on donut economics):
        - Restore a wetland (Henning Larson, Cøpenhagen; Effekt, Denmark)
        - Create habitat for wildlife (WWF Headquarters)
        - Create community spaces and assets
- Assess which interventions can be done when (seasonal restrictions, occupancy, use of building, timing on leases etc.)
- Assess interventions holistically and bundle them together conscientiously so that:
    - Building efficiency is upgraded:
        - Operational savings
        - Carbon savings
        - Water savings
    - Red flag issues are addressed (windows that won't open, surfaces covered in mould)
    - Upgrades address past issues and prevent damage from future climate events
    - Upgrades do not prevent future adaptive uses of building
    - Occupants also receive benefit (visible perks like upgrading common areas)

Top Takeaway

We need to understand the client, their drivers, the building, and risks associated with doing the upgrades. When we work with the client we need to develop a master plan that everyone can follow—this is crucial.

It's crucial for sustainability and resilience to go beyond Passivhaus, and make sure that you are meeting the needs, while doing the work conscientiously, while planning for climate resiliency and create a healthy building that works to restore the ecosystems, create community and regenerate the environment.

What's Next

- We'd like to draft up a step-by-step process template for a retrofit design process
- Why are we designing buildings that have the same indoor environments

year round? This has a huge impact on our environment. Can there be a range instead? What would be the carbon savings?

- Why doesn't Passive House consider embodied carbon? This is super important.
- We need to be designing futureproof buildings that are adaptable, that will protect peoples' lives and won't get damaged as easily.

Resources

The Atmospheric Fund (TAF) Retrofit Accelerator for MURBs in the Greater Toronto Area: Sandra at affectingchange wrote the award-winning prototype competitive RFP process for the retrofit of seven buildings on four sites that formed the foundation of the MURB retrofit accelerator: https://retrofits.taf.ca/ (Case studies are also on this page.)

Phased Retrofits Multifamily/Large Building Lab's Collaborative Slide Deck - https://docs.google.com/presentation/d/1qOFV-6UaSwTBBR9Dk2InhkJ0Q4TzXPau45uhDnMe-vY/edit?usp=sharing