

# Millview Passive House:

- *Beautifully sustainable*



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# Context for this presentation

- Focus is new construction
  - Retrofits present different challenges
- Scalability
- Balance is what it's all about
- Everything you do counts

**DO WHAT YOU  
CAN, WITH WHAT  
YOU HAVE, WHERE  
YOU ARE.**

**THEODORE ROOSEVELT**



# Setting

- Village of Manotick, on the outskirts of Ottawa
- Traditional territory of the Algonquin
- On the Rideau River
- Across from historic Watson's Mill
- A short walk to shops and services in the village
- Former location of Canadian Bung, Plug & Spile Co.



# Bung Mill (on this site)



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# Project Team

- Owners: Bruce Fanjoy & Donna Nicholson
- General Contractor: Bruce Fanjoy
- Architect: Nicholas Semanyk, Urban Keios
- Project Manager: Jeff Hawes, Just for Homes Inc.
- Many skilled tradespeople and suppliers

# Sustainability goals

- Net-zero energy
  - Energy used by the house is offset by renewable energy created onsite
- Net-zero green house gases (GHG)
  - Zero fossil fuels
  - Offset embodied carbon from construction
- Sustainable building materials
  - Build to last seven generations or more
  - Local suppliers

# Passive house basics

- Orient toward the sun
- Building envelope is key
- Insulate, insulate, insulate
- Avoid thermal bridges
- Don't forget shade
- High performance windows, right size, right location
- Heating, ventilation, air conditioning (HVAC) system



# Four pillars

1. Orientation
2. Conservation
3. Electrification
4. Generation



# 1. Orientation



## Keys:

- Benefit from passive solar gain & active solar generation
- Synergize orientation & design
- South-facing roof with space for solar array

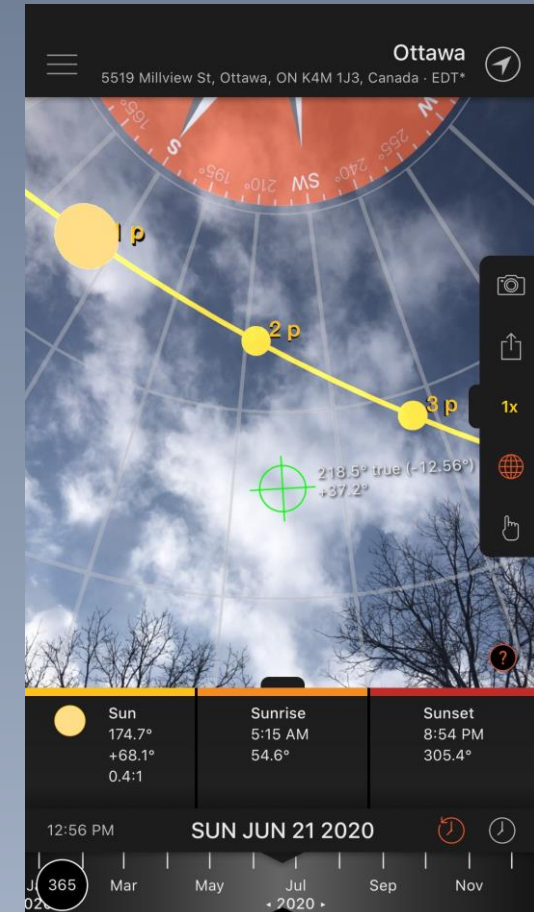


# 1. Orientation (Sun)

December 21  
Winter Solstice

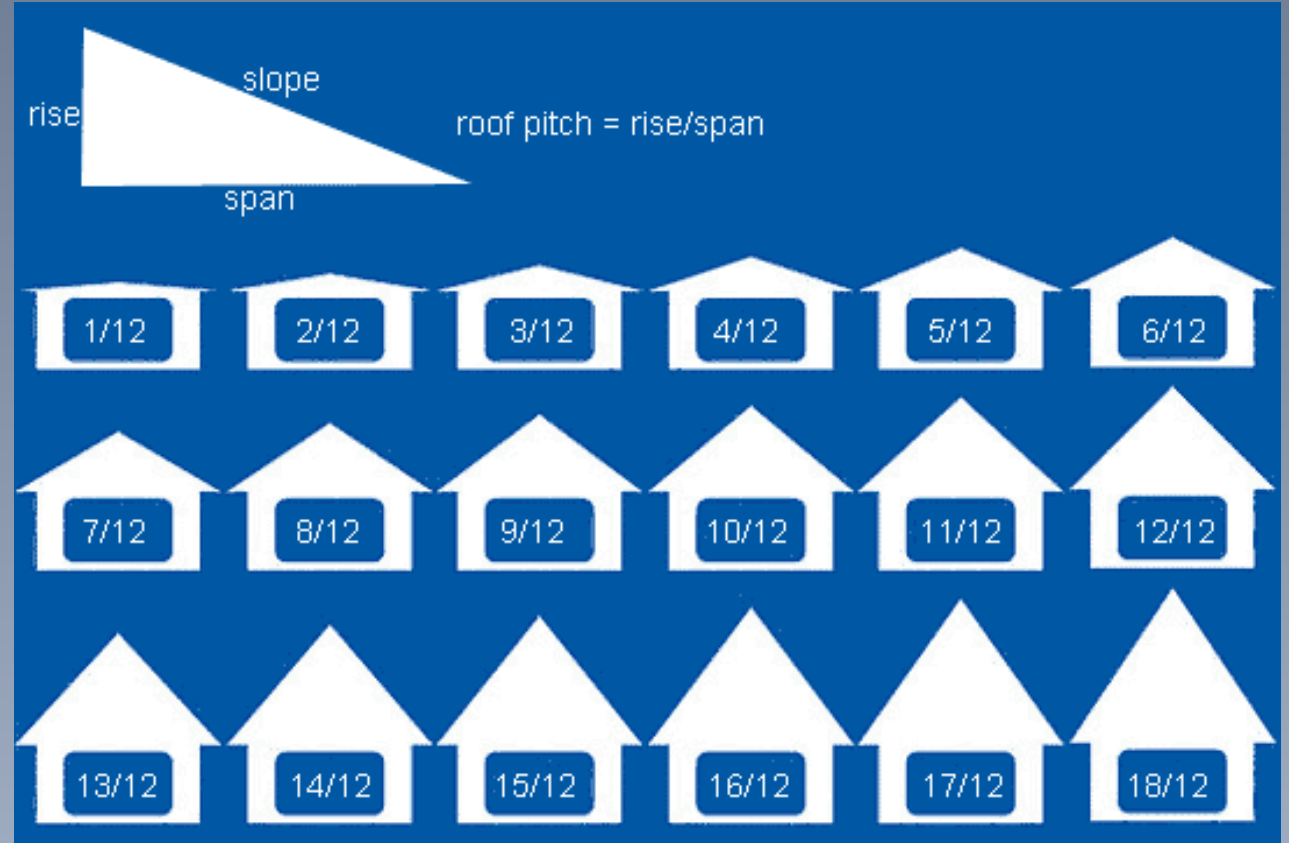


June 21  
Summer Solstice



# 1. Orientation (roof pitch)

- Keep south-facing roof design simple (for solar panels)
- South-facing roof pitch matters
  - On grid or off grid
  - Latitude
- Millview roof pitch is 8/12 (approximately 34 degrees)



# 1. Orientation (West Side Story)

- Risk of evening sun providing too much heat gain in summer
- Fewer windows mitigates the risk
- Shade trees also





# Shade

- Design originally had brise-soleil to shade main floor



## 2. Conservation (shape)



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## 2. Conservation (wall design)

- Larsen Truss wall design



## 2. Conservation (insulation)

Location	R Value	Insulating Material
Walls (above grade)	62	Cellulose, fibreglass
Attic	90	Cellulose
Foundation wall (below grade) <small>Effective R value</small>	50*	Insulated concrete forms (ICF)
Basement floor	10	Extruded polystyrene

## 2. Conservation (insulation)



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## 2. Conservation (foundation)



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## 2. Conservation (windows)

- Gaulhofer windows on 1<sup>st</sup> and 2<sup>nd</sup> floors (triple pane)
- North Star windows in basement, plus oval and eyebrow windows (triple pane)





## 2. Conservation (doors)



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### 3. Electrification (HVAC)

- Air source heat pump (heating and cooling)
- Electric furnace
- Electric boiler for hydronic heated basement floor
- Hot water heater
- Energy recovery ventilation (ERV)
- All appliances

### 3. Electrification (one exception)

#### Wood stove:

- Personal design choice
- Heat distributed throughout the house
- Heat source in event of power outage
- **\*IMPORTANT\*** Closed unit with fresh-air intake
- **\*ALSO IMPORTANT\*** Bird-proof chimney





# Fresh-air intake



## 4. Generation

- 33 x 330KW solar panels
- Net-metering with Hydro One
- Connected without penetrating roof
- Battery ready



## 4. Generation (winter)



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# View from the solar array



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# Performance

	Used from grid	Returned to grid	Surplus
April 2021	496 kWh	1,090 kWh	594 kWh
May 2021	432 kWh	1,230 kWh	798 kWh
June 2021	461 kWh	1,023 kWh	562 kWh

- Surplus accumulates with the electric utility (Hydro One) as a credit against future energy use
- Credits will be drawn down in winter
- Credits expire after 12 months



# Performance (the dog approves)



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# Performance (fan mail)



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# Performance (reply to fan mail)





# Lessons

- Surround yourself with knowledgeable/skilled people who share your vision
- Build for this century, not last century
- Nature leads, design follows
- Verify upfront that HVAC system is configured optimally
- Don't wait until the end of the project to install solar panels

# Questions?



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