

Memorandum

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**To:** Climate Action Committee

**From:** Bill Sterling

**Date:** May 5, 2022

**Re:** Wayland CoA/Community Center -Sustainable Design Goals

**Will the CoA/Community Center be a sustainable building?**

Yes, it will be a Net Zero Carbon building with no fossil fuels used on site. Furthermore, it will be designed to minimize energy used on site with a Net Zero Energy goal. Part of that goal will include the employment of solar energy principles in the building design, using enough PV panels on site for conversion of solar energy to electricity needed to operate the building. Finally, the designers have been encouraged to reduce waste, reuse as much of the existing building that is economically reasonable and use recycled and recyclable products as much as possible on this project.

**Net Zero Carbon Goals-**

The HVAC system will have an energy recovery ventilation system (ERV). It will be heated and cooled with a VRF air-to-air heat pump system that is all electric. The kitchen appliances will be all electric. The only fossil fuels used will be in the rare occasion that an emergency generator is brought on site in the case of power failure to the building.

All windows shall be operable and rooms fitted with ceiling fans so that outdoor air may be used whenever the building manager believes fresh air is comfortable enough for indoor activities. Windows will be fitted with sensors that will automatically shut off the HVAC to whatever rooms have opened windows. This should reduce the use of energy to operate mechanical systems.

Finally we are committed to reducing the use of embodied carbon in the building products being used in the new construction. Minimizing the use of vinyl throughout the building is one major sustainable effort. Using linoleum flooring instead of vinyl flooring is an example. Using cement board siding instead of vinyl siding is another.

**Net Zero Energy Goals-**

Passive House principles are being employed to adapt the existing building with an air-tight envelope that is better insulated than the original design. The roof will be insulated with an R=59, the walls with an R=40 and the existing floor slab will be provided with an R=10 insulation. Even more important will be a new continuous vapor permeable air barrier system added to the entire building envelope that will reduce the air infiltration to the minimum possible, tested using a blower-door. In addition, a new air and vapor barrier will be installed under a new slab being installed over the entire ground floor.

**Solar style design-**

A solar style building is a design form derived from roof pitch and solar orientation, window proportioning and shading devices that make the building a "machine for collecting solar energy." There is both an active and a passive component to a solar design.

Passive solar design involves site placement for optimum solar benefit and the selective use of glass depending on each wall's solar orientation. Because even triple glazed windows are not well insulated, they can be a major source of unwanted heat gain and heat loss, making for inefficient envelope design depending on their solar orientation. Best practice is to face the largest area of glass to the south, to place moderate amounts of glass east and west (7% of the wall area) and minimize glass facing north (under 5%). With the addition of fixed sun shading devices on the south side, summer sun can be blocked from hitting the glass while winter sun will be allowed in to generate passive heat gain. Captured solar energy can then be retained in the winter by dropping insulating shades after the sun sets, using motorized shades on timers.

The active component to solar style design is the use of photovoltaic panels that may produce enough solar-generated electricity to offset the entire building's annual electrical usage. The building shall be fitted with switching gear and a layout for concrete pads for future batteries to store electricity on site.

The parking lot shall be served with electric car charging stations and underground conduit for future expansion of charging stations as the demand increases in the future.