# Achieving Net-Zero

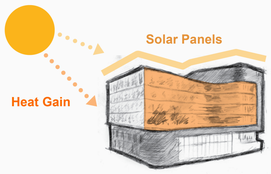
Getting to net-zero demands careful attention and wise choices reaching beyond traditional channels and processes. The School of Social Work New Building (SSWNB) includes interconnected, holistic architectural and systems-based strategies that exemplify balance between sustainability and operability.

**65%** Less Energy than Traditional Building (Including solar panel array)

**0** Operational Fossil Fuels

## Optimized Solar Orientation

Allow for solar gains to passively heat the building, or to capture and store solar energy in the ground via geoexchange heat pumps for use in heating season.

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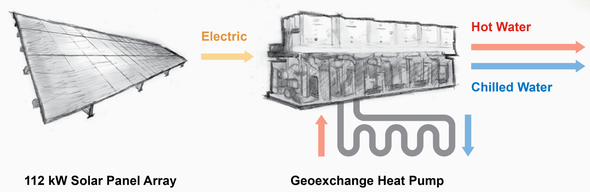
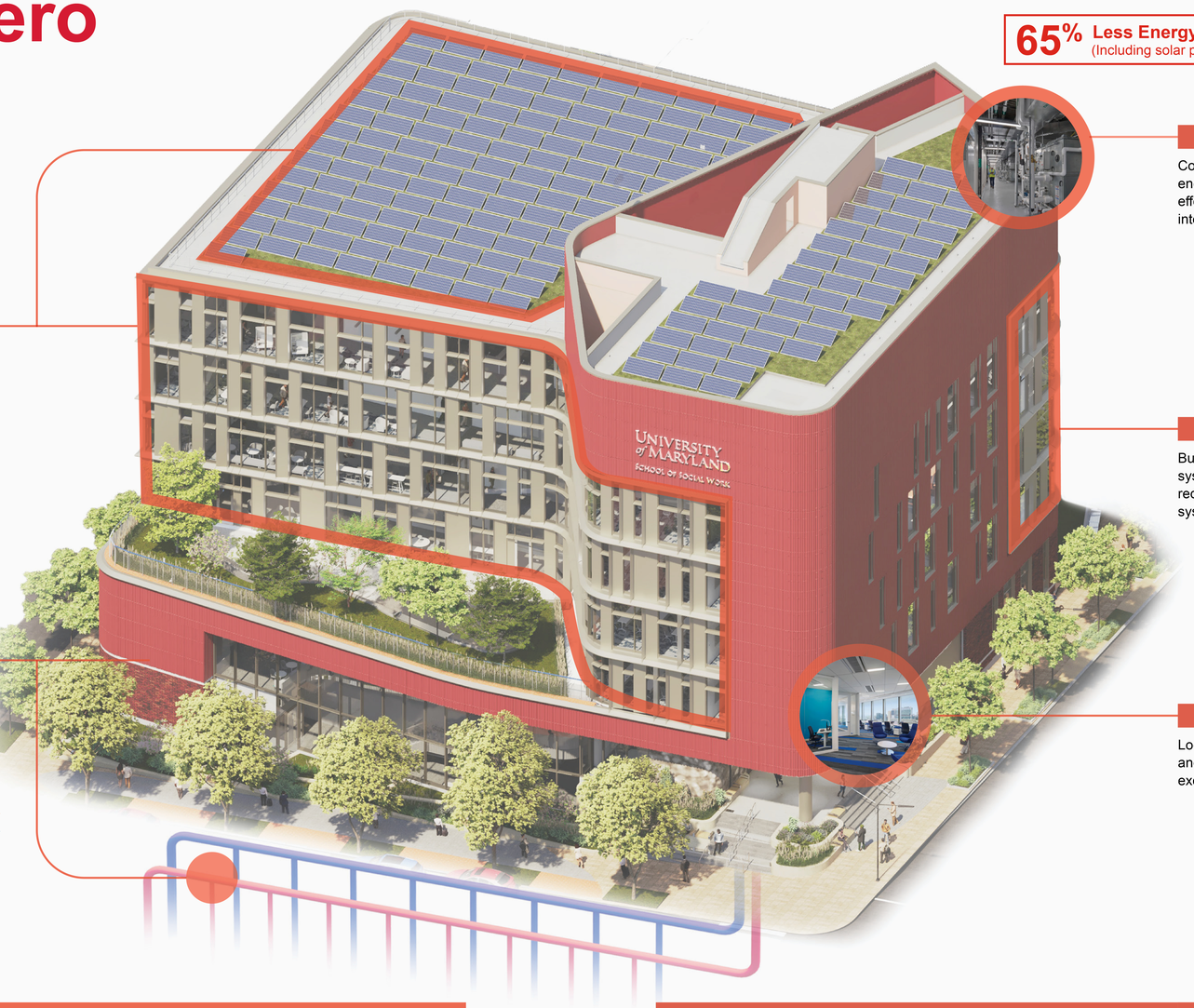
## Zero Carbon System

Rooftop solar panels along with supplemental off-site renewable energy allow for a fossil-fuel free, all-electric approach that generates low temperature hot water to heat and chilled water to cool the building.



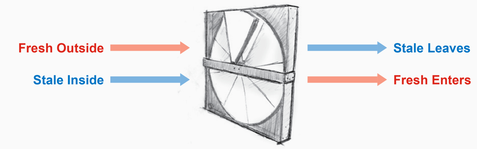

112 kW Solar Panel Array

Geoexchange Heat Pump



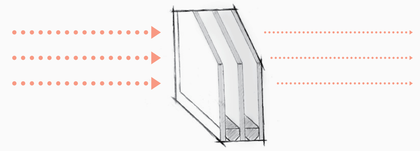

## Neutral Air Energy Recovery

Conditioning ventilation air can account for over 50% of the building's total annual energy usage. This system pretreats incoming outdoor air through a highly effective energy recovery process while nearly eliminating "reheat", an energy-intensive practice common in traditional HVAC systems.



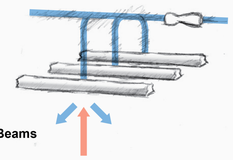

## High Performance Envelope

Building heating efficiency drastically increases with low temperature hot water systems. Highly insulated, airtight wall assemblies with triple glazed windows reduce heat transfer by over 40% and allow for use of low temperature hot water systems (<120°F).



## Heating & Cooling Systems

Local heating and cooling systems using chilled beams allow for flexible space and temperature control and enhanced human comfort without the need for excessive airflow and fan energy.

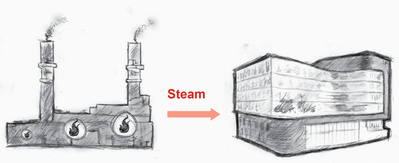


Chilled Beams

## Traditional System

Most buildings on UMB's campus are heated by steam generated from fossil fuels via an off-site energy service provider. This process is inherently inefficient, and carbon + maintenance intensive.

District chilled water plants serving the campus remove heat from the buildings. The heat is dissipated from the building to the outdoors using cooling towers. The SSWNB mechanical systems reimagine how this "waste" heat can be repurposed.




Boiler Plant

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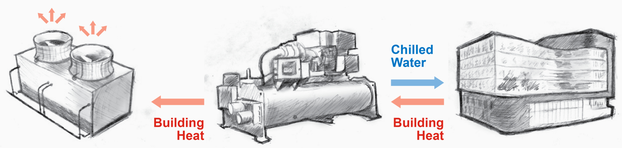


Cooling Tower

Chiller

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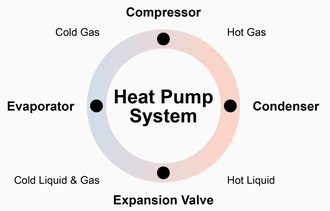
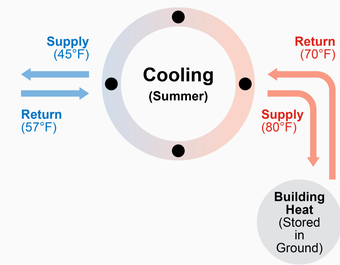
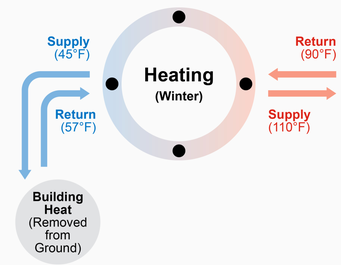
## How a Heat Pump Works

Using the vapor-compression refrigeration cycle, heat pumps located in the building's mechanical room transfer heat to where it is needed. This process is 3-5 times more efficient than heat produced by a boiler. During cooling season, instead of rejecting building heat to the outdoors using cooling towers, the heat pumps store it in the ground through the geoexchange borefield located underneath the building. The ground serves as a long-duration thermal energy storage mechanism. Heat is removed from the ground and used in the building during heating season. The temperatures of the ground (50-70°F) allow for increased efficiency compared to traditional air-source heat pumps that extract heat from cold outdoor air (0-40°F).

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