Project Goals
2016 MASTER PLAN CONCEPT OPERATIONAL GOALS

- Moving the building closer to the parking lot
- Classroom space that opens into a larger conference/rental room
- Separating exhibit space with classroom space
Energy Goals and Strategies
ZERO ENERGY IS AN ONGOING BALANCING ACT

1 – Reduce building energy use as much as possible in design
2 – The remaining energy needed is covered by renewable site resources
3 – Continue to fine tune the operation of the building over its life
ZERO ENERGY BUILDING CERTIFICATION: MINNESOTA METRICS

1) Zero Energy Buildings:
Have achieved ZE for at least 12 months, the total consumption of energy from all sources has been fully balanced by onsite renewable energy generation on an annual basis and NBI has verified performance data. The St. Paul Science House is in this database, but there are no non-residential projects yet certified.

2) Zero Energy Emerging Buildings;
have a publically stated goal of reaching ZNE but have not yet demonstrated achievement. There are 2 MN buildings in this category.

3) Ultra-Low Energy Verified Projects:
Documents energy performance dramatically better than industry average. The City of St. Louis Park Fire Station #2 is listed in this category.

AN ONGOING EFFORT AND STORY...
ESTIMATED BUILDING ENERGY USE: HOW WE GET TO ZERO ENERGY

Energy Use Intensity (kBtu/sf-yr)

<table>
<thead>
<tr>
<th>Code Level Design</th>
<th>Highest Performance Design</th>
<th>Renewable (PV) Generation</th>
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<tr>
<td></td>
<td>65</td>
<td>47% reduction in energy use from code</td>
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<td>31</td>
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- Maximum PV Generation
- Base PV Generation
- Fans
- Cooling
- Heating
- Heat Lamps
- Interior Lighting
- Interior Equipment

47% reduction in energy use from code.
UNDERSTANDING OUR SITE RESOURCES: SOLAR RADIATION ANALYSIS

PASSIVE STRATEGIES:
- PROVIDE SHADING
- ALLOW SOLAR GAIN
UNDERSTANDING OUR SITE RESOURCES: WIND ANALYSIS

PASSIVE STRATEGY: NATURAL VENTILATION IN SHOULDER SEASONS
Site and Building Design Concepts: Project as a Teaching Tool
Proposed Project

New Outdoor Classroom

New Building and Parking Area (69 stalls)
Site Plan

1. Main Entry Porch
2. Group Entry Porch
3. Bus Drop-Off
4. Service Entry
5. Paved Parking Lot (69)
6. Overflow “Green” Parking
7. Picnic & Play
8. Bridge
9. Patio
10. Classroom Deck
11. Turtle Pond Connection
12. Bird Watching
13. Primary Trail Connections
14. “Threshold” Prairie
15. Forest “Threshold”
16. Landscape Classroom
SECTION STUDIES: Passive Solar Heating + Occupant Thermal Comfort
Daylight Harvesting
Air Flow
Renewable Energy
Visual Connection
SECTION STUDIES: Passive Solar Heating + Occupant Thermal Comfort

- Thermally massive wall absorbs solar heat and slowly dissipates it through the space.
- Shading blocks radiation from reaching the wall in summer.
- Triple element glazing limits cold drafts next to windows.
- Radiant floor slabs increase occupant comfort.
SECTION STUDIES:  Daylight Harvesting

angled roof allows for light to wash and reflect into space

classrooms receive even, indirect north light

direct light is limited to corridor area

highest sun angle (summer: 66 degrees)
average sun angle (equinox: 43 degrees)
lowest sun angle (winter: 19 degrees)
SECTION STUDIES:  Air Flow

Air is drawn through the building by the pressure differential on each side.

Shaded side of building

Sunny side of building
SECTION STUDIES: Renewable Energy

- Highest sun angle (summer: 66 degrees)
- Average sun angle (equinox: 43 degrees)
- Lowest sun angle (winter: 19 degrees)

South facing roof area: 15,194 sf
8 degree tilt

457 (350 watt panels) 40” x 79”

Energy Target: 40 EUI
66% roof usability factor
(amount of roof needed to use to achieve the system rating)
System rating: 160 kW
Produces 182,876.3 kWh/year
Multipurpose Rooms are Connected to the Landscape
Harvesting solar energy through a thermally massive feature wall in the hallway
Exhibit Design Concepts
Come forth into
the light of things,
let nature be your teacher.

-William Wordsworth

The Big Idea

The Big Idea is an organizing statement that guides the exhibit’s development and all of the interpretive elements it includes. As an organizing statement, it is similar to a thesis in an essay. The Big Idea for WHNC was developed with staff during the project’s start up meeting. It is a statement that we will all continue to use throughout the exhibit development process, but it is not a statement that visitors will see.

The Big Idea for Westwood Hills Nature Center exhibits is: By learning about and understanding our natural habitats and by looking at the use of our landscape over time, we encourage visitors to build personal connections with nature and a desire for further exploration. We also use the nature center’s exhibits to encourage environmental stewardship and sustainable practices.
Interactive Beehive Display
Thank You!